DOCUMENT RESUME

ED 375 023 SO 024 067

AUTHOR	Luftig, Richard L.
TITLE	The Schooled Mind: Do the Arts Make a Difference? An Empirical Evaluation of the Hamilton Fairfield SPECTRA+ Program, 1992-93.
INSTITUTION	Miami Univ., Oxford, Ohio.
SPONS AGENCY	Hamilton Fairfield Arts Association, Hamilton, OH.
PUB DATE	[94]
NOTE	70p.
AVAILABLE FROM	Hamilton Fairfield Arts Association, Fitton Center for Creative Arts, 101 South Monument Avenue, Hamilton, OH 45011-2833 ($10).
PUB TYPE	Reports - Evaluative/Feasibility (142)
EDRS PRICE	MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS	*Art Appreciation; *Art Education; *Creativity; Creativity Tests; Elementary Secondary Education; Mathematics Achievement; Self Esteem; Sex Differences; Summative Evaluation
IDENTIFIERS	Fairfield City School District OH; Hamilton City School District OH; SpectraPlus Program

ABSTRACT

The Spectra+ program is a 4-year model arts initiative being conducted in four elementary schools in two southwestern Ohio cities. An empirical study compared students in a Spectra+ program with two groups of students in two alternate, non-Spectra+ programs in districts A and B to measure differences in creativity, academic achievement, self esteem, locus of control, and appreciation of the arts. Results showed that on creativity tests, Spectra+ children scored highest overall on the total test, originality, and resistance to closure. Reading and mathematics achievement scores were examined prior to and following program treatments. Spectra+ students showed no differences in reading improvement from Group A, but less achievement improvement than group B. Spectra+ males showed greater mathematics improvement than Group A as a whole, while the Spectra+ girls showed the lowest mathematics improvement. There was no difference in Spectra+ and group B students in total mathematics achievement. Grade and gender were more significant to self-esteem than either Spectra+ or other treatments. There were no significant differences among the groups in locus of control measures. In total arts appreciation measures, Spectra+ students scored highest. Recommendations called for: (1) continuance of Spectra+ program in the school districts employing it; (2) longitudinal evaluation of areas showing inconclusive results; (3) expansion of the Spectra+ program to use among older students; (4) and investigation of the gender inequities shown among Spectra+ students in terms of mathematics achievement and social self-concept functioning. (MM)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED 375 023

THE SCHOOLED MIND: DO THE ARTS MAKE A DIFFERENCE?

An Empirical Evaluation of the Hamilton Fairfield SPECTRA+ Program, 1992-93

U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

X This document has been reproduced as received from the person or organization originating it.

☐ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official OERI position or policy

"PERMISSION TO REPRODUCE THIS MATERIAL IN OTHER THAN PAPER COPY HAS BEEN GRANTED BY
RICHARD L. LUFTIG

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

RICHARD L. LUFTIG, PH.D.
PROFESSOR AND ASSOCIATE
CENTER FOR HUMAN DEVELOPMENT, LEARNING, AND TEACHING
MIAMI UNIVERSITY
OXFORD, OH

SO 024 067

BEST COPY AVAILABLE

THE SCHOOLED MIND: DO THE ARTS MAKE A DIFFERENCE?

An Empirical Evaluation of the Hamilton Fairfield SPECTRA+ Program, 1992-93

RICHARD L. LUFTIG, PH.D.
PROFESSOR AND ASSOCIATE
CENTER FOR HUMAN DEVELOPMENT, LEARNING, AND TEACHING
MIAMI UNIVERSITY
OXFORD, OH

ACKNOWLEDGMENTS

An evaluation project the size and scope of this cannot be planned and carried out by one single person. Rather, throughout this project there were a large number of individuals, organizations, and companies who offered their support, help, funds, and expertise in order to see the project through to its fruition.

The project was initiated and funded by the Hamilton Fairfield Arts Association, Rick H. Jones, Director. Special thanks go to the Board of the Arts Association for their support and interest throughout the project. It was supported at Miami University through the auspices of the Miami Center for Human Development, Learning, and Teaching, Doris Bergen, Director.

Special thanks must also go to the Hamilton City School District and the Fairfield City School District for their cooperation in this study. The staff and students at Fillmore Elementary School (Rex Bucheit, Principal) and at Adams Elementary School (Kathy Leist, Principal) in Hamilton and at Fairfield North Elementary School (Laura Meibers, Principal; Arlene Swihart, Assistant Principal) and Fairfield West Elementary School (Frank Price, Principal; Kathy Dixon, Assistant Principal) are warmly acknowledged. Without their help and cooperation, this project would have been impossible.

There were a number of educational administrators who were specifically helpful in securing placement sites as well as providing needed and necessary student information. These persons include Lon Stettler and Carolyn Reinhart of the Hamilton City School District (both of whom provided invaluable information) and the other unnamed members of the evaluation team who helped conceptualize the study.

It is a fact of life that any evaluation of this size and scope costs money. A number of corporations and organizations provided crucial financial support in terms of donations and services without which the project would have proven impossible to carry out and report. Such financial and services support was provided by the **Hamilton and Fairfield School Districts, the Ohio Arts Council, the Miller Brewing Company, Beckett International Paper Company, the Ohio Casualty Insurance Company, the Cincinnati Fine Arts Fund, and Judy and Ira of Georgia**.

Data preparation and scoring become issues in a project of this scope and magnitude. The author sincerely wishes to thank Jenny Imhoff and Connie Betts for their help in administering and scoring tests as well as Donna Hanby and Terry Toney for encoding student academic achievement data. Likewise, the author wishes to thank Betty Marak for her expert typing and copy reading services. Mrs. Marak continually demonstrated her expertise in turning the author's destruction of the English language into sensible, meaningful prose. Likewise, the author acknowledges the efforts of David O'Fallon, Director of The Arts Education Partnership Working Group at the Kennedy Center, Washington, D.C., and Doug Herbert, Director of the Arts in Education Program: The National Endowment for the Arts, Washington, D.C., for their input and comments regarding this manuscript.

There are three people who were particularly central to this project and without whose help the project would have been impossible to carry out and complete. The first such person is Michael B. Hughes of the Mathematics and Statistics Department at Miami University. Mike was selfless and always available to help prepare over 186,000 pieces of data taken at four different time periods for analysis. He put up with the author's limited computer skills and agreed to write programs in an older computer language familiar to the evaluator rather than the language with which Mr. Hughes was more familiar. Without his help, the author of this project could have never begun to statistically analyze the data; the magnitude of his contribution to the project cannot be overstated.

The second person who needs special acknowledgment is Rick H. Jones, Director of the Hamilton Fairfield Arts Association. Throughout this project, Rick was always available, giving encouragement, leading by example, and dealing with the multitude of egos and ideas (including the author's) that could have derailed the project at a variety of times. Rick's particular brand of leadership was instrumental in the project coming to fruition, and his expertise in procuring financial and service support insured that the project would have adequate funds to be completed. His leadership and friendship mean more to the evaluator than he can know.

The final person who deserves special acknowledgment is Karen Gaski. Karen was the coordinator of the project

for the Arts Association. She was there at its inception and was the field person in every aspect of the study from data collection through analysis through manuscript preparation. To say that Karen was the glue that held the project together is probably the understatement of the century. She offered her time, her expertise, her attention to detail, her car, and, most importantly, her friendship to the project. She also now knows more about statistics and statistical methods than she ever desired.

To all of the people and organizations listed above, a special thanks. You all played an important part in the project, and any success that this project and evaluation gains are because of you.

TABLE OF CONTENTS

CHAPTER ONE INTRODUCTION 1

1. ARTS, EDUCATION, AND THE SCHOOLS 1

2. THE SPECTRA+ PROGRAM 2

Goals of the SPECTRA+ Program 3
Principles of the SPECTRA+ Program 3

3. CONCLUSION 4

CHAPTER TWO METHODOLOGY 5

INTRODUCTION 5

1. SUBJECTS 5

Subject Recruitment 6

2. EXPERIMENTAL CONDITIONS 7

SPECTRA+ Condition 7
Modified Control Condition 7
Full Control Condition 8

3. EXPERIMENTAL INSTRUMENTS 9

Culture-Free Self-Esteem Inventory 9
Bialer-Cromwell Locus of Control Scale 10
Torrance Tests of Creative Thinking 10
Arts Appreciation Test 11
Academic Achievement Measures 12
Why These Variables Were Chosen 12

4. PROCEDURE 13

Pilot Study 13
Main Study 13

5. DATA PREPARATION 14

6. STATISTICAL PROCEDURES 14

CHAPTER THREE RESULTS 16

INTRODUCTION 16

1. CREATIVITY 17

Total Score 17
Fluency 17
Originality 17
Abstractness of Titles 18

Elaboration 18
Resistance to Closure 18
Summary of Torrance Tests for Creative Thinking Data Analysis 20

2. *ACADEMIC ACHIEVEMENT* 20

School District A 20
Total Reading 20
Reading Vocabulary 20
Reading Comprehension 20
Total Math 21
Math Concepts 21
Math Application 21
Math Comprehension 21
School District B 24
Total Reading 24
Reading Vocabulary 24
Reading Comprehension 24
Total Math 24
Math Concepts 25
Math Application 25
Math Comprehension 25
Summary of Data Analysis for Academic Achievement 25

2. *SELF-ESTEEM* 26

Total Self-Esteem 26
General Self-Esteem 26
Social Self-Esteem 26
Academic Self-Esteem 28
Parental Self-Esteem 28
Summary of Self-Esteem Data Analysis 30

4. *LOCUS OF CONTROL* 30

5. *APPRECIATION OF THE ARTS* 30

Total Arts Appreciation 30
What Makes a Work of Art Good? 30
What Makes a Piece Artistically Valuable? 31
Question 1 31
Question 2 31
Question 3 32
Question 4 32
Question 5 32
Question 6 32
Question 7 37
Question 8 37
Question 9 37
Question 10 37
Which One of These is a Work of Art? 37
Materials Used in School 37
Arts Activities in School 38
Aesthetic Value of a Picture 38
Visited or Attended and Would Like to Visit or Attend Museums, Concerts, and Dance Recitals 41

How Often Have You Visited an Art Museum or Gallery? 41
How Often Have You Attended a Musical Concert? 41
Would You Like to Attend a Concert? 41
How Often Have You Watched Modern Dance or Ballet? 41
Would You Like to Attend a Modern Dance or Ballet? 41
Artistic Activities Engaged in Outside of School 45
Value of Art and Artistic Works 45
There is No Real Value to Art Unless One Wants to Become an Artist 45
A Work of Art Should Tell a Story 45
For Music To Be Good, It Should Have Words 45
It Is a Waste of Time to Dance 46
Summary of Appreciation of Arts Data 46

CHAPTER FOUR SUMMARY, DISCUSSION, AND RECOMMENDATIONS 47

1. *METHODOLOGY* 47
2. *CREATIVITY* 48
3. *ACADEMIC ACHIEVEMENT* 49
4. *SELF-ESTEEM* 51
5. *LOCUS OF CONTROL* 52
6. *APPRECIATION OF THE ARTS* 52
7. *RECOMMENDATIONS* 53
8. *CONCLUSIONS* 53

REFERENCES 55

LIST OF TABLES

Table		Page
1.	Subject Pool by Gender, Grade, and Condition	6
2.	Demographics of Subject Pool	7
3.	Conditions Within Schools	9
4.	Variables Tested With Corresponding Research	9
5.	Reliability and Validity Information Regarding the Culture-Free Self-Esteem Inventory	10
6.	Values Measured by the Arts Appreciation Test	12
7.	Ordered Mean Difference Scores for Total Creative Thinking Between the Three Condition Groups (Percentiles)	17
8.	Ordered Mean Difference Scores by Condition Groups on Originality	18
9.	Ordered Mean Difference Scores for the Condition Groups on the Variable of Originality	18
10.	Ordered Mean Difference Scores of the Condition X Grade Groups and Post-Hoc Analysis of Differences Between Groups (Least Squares Method) on Resistance to Closure	19
11.	Ordered Mean Difference Scores for the Condition X Gender Groups in School District A on Total Math Achievement (Percentiles) with Post-Hoc Analysis (Least Squares Method) of Differences Between the Groups	22
12.	Ordered Mean Difference Scores for the Condition X Gender Groups in School District A on Math Concepts (Percentiles) With Post-Hoc Analysis (Least Squares Method) of Differences Between Groups	23
13.	Ordered Mean Difference Scores for the Three Condition Groups in School District A for the Variable of Math Comprehension (Percentiles)	23
14.	Mean Difference Scores for the Condition Groups in School District B on Total Reading Achievement (Percentiles)	24
15.	Mean Difference Scores for the Condition Groups in School District B on Reading Vocabulary (Percentiles)	24
16.	Mean Difference Scores for the Condition Groups in School District B on Reading Comprehension (Percentiles)	25
17.	Mean Difference Scores for the Condition Groups in School District B on Math Comprehension	25
18.	Ordered Mean Difference Scores of the Condition X Grade Groups on General Self-Esteem and Post-Hoc Analysis of Differences Between Groups (Tukey Procedure)	27

19. Ordered Mean Difference Scores for the Condition X Gender Groups on Social Self-Esteem With Post-Hoc Analysis (Least Squares Method) of Differences Between the Groups 28

20. Ordered Mean Difference Scores of the Condition X Grade Groups on Parental Self-Esteem and Post-Hoc Analysis of Differences Between Groups (Tukey Procedure) 29

21. Mean Difference Scores on Total Appreciation of the Arts by Experimental Condition and Post-Hoc Analysis of Differences Between Groups (Tukey Procedure) 31

22. Ordered Mean Difference Scores of the Condition X Grade Groups and Post-Hoc Analysis of Differences Between Groups (Least Squares Method) on Question 2 Regarding Valuing Art 33

23. Ordered Mean Difference Scores of the Condition X Grade Groups and Post-Hoc Analysis of Differences Between the Groups (Least Squares Method) on Question 3 Regarding One's Likes and Dislikes Being the Sole Criterion for Deciding Whether a Work of Art is Good 34

24. Ordered Mean Difference Scores of the Condition X Grade Groups and Post-Hoc Analysis of Differences Between the Groups (Least Squares Method on Question 4 Regarding Whether a Painting Must Look Like Something Real 35

25. Ordered Mean Difference Scores of the Condition X Grade Groups and Post-Hoc Analysis of Differences Between the Groups (Least Squares Method on Question 5 Regarding Person Needing Special Talents to Become an Artist 36

26. Ordered Mean Difference Scores for Each Condition on Question 6 Regarding the Importance of Understanding Art 37

27. Ordered Mean Difference Scores for Each Condition on Question 7 Regarding Whatever a Person Likes Constituting Art 37

28. Ordered Mean Difference Scores for Each Condition on the Sum Total of Art Materials Encountered in School 38

29. Ordered Mean Difference Scores of the Condition X Grade Groups and Post-Hoc Analysis of Differences Between the Groups (Least Squares Method) for Arts Activities Engaged in While at School 39

30. Ordered Mean Difference Scores of the Condition X Grade Groups and Post-Hoc Analysis of Differences Between Groups (Least Squares Method) for Enjoyment of Viewing a Picture 40

31. Ordered Mean Difference Scores of the Condition X Grade Groups and Post-Hoc Analysis of Differences Between Groups (Least Squares Method) on Visits to an Art Museum or Gallery 42

32. Ordered Mean Differences Scores for Each Condition on Attending a Musical Concert 43

33. Ordered Mean Difference Scores for Each Condition on Watching Modern Dance or Ballet 43

34. Ordered Mean Difference Scores of the Condition X Grade Groups and Post-Hoc Analysis of Differences Between Groups (Least Squares Method) on Wanting to Watch Modern Dance or Ballet 44

35. Ordered Mean Difference Scores for Each Condition on Art Having No Value Unless One Plans to Become an Artist 45

36. Ordered Mean Difference Scores for Each Condition on Variable That for Music To Be Good It Should Have Words 45

37. Ordered Mean Difference Scores for Each Condition on Belief That It Is a Waste of Time To Dance 46

CHAPTER ONE

INTRODUCTION

1. ARTS, EDUCATION, AND THE SCHOOLS

The inclusion and delivery of arts into the educational curriculum of children have a long and somewhat controversial history. Sometimes locked in an adversarial relationship, educators involved in creating the curricular goals of children have been concerned primarily with issues related to academic achievement, while arts educators have often been interested in the value of the arts in creating persons in touch with themselves and their culture (National Commission on Music Education, 1991).

This is not to imply that educators and artists are on opposite poles of a dichotomous issue. In recent years, a number of influential educators have come to realize that the arts should hold an important and valued place in the educational curriculum (Boyer, 1983; Goodlad, 1984). For example, in his important book entitled High School, Boyer (1983) wrote that the arts are part of "a common core of living and are not a curricular frill." Likewise, the report Basic Education (1990) concluded that **all** students should graduate with the ability to appreciate literature, music, and the visual and performing arts. Furthermore, the report went on to state that it is important that students have these experiences because appreciation of the arts is integral in knowing oneself, in developing sound moral values, and in providing insight into the common themes of humanity.

Despite these opinions of influential educators about the importance of the arts in the school curriculum, many arts educators believe that the arts are becoming increasingly less important in the education of students. For example, a recent commission report on the arts in education found that the arts are being pushed to the curricular periphery in schools and thus students are losing touch with the unifying force in our culture (National Commission on Music Education, 1991). This same commission found that "recent educational reform has tended to omit the arts or treat them as expendable." In fact, in the creation of his six National Education Goals, President Bush excluded **any** mention of the arts.

Further evidence of the paucity of support for the arts in public education was demonstrated in a recent study conducted by the National Endowment for the Arts (NEA). The study reported that while the educational budget for the National Science Foundation is approximately 171 million dollars, the dollar amount spent on arts education by the NEA was not quite 6 million dollars (Fowler, 1990; National Endowment for the Arts Report, 1989). In its report the NEA went on to further state that ". . . the arts are in triple jeopardy: they are not viewed as serious, [art] knowledge itself is not viewed as a prime educational objective, and those who determine school curricula do not agree on what arts education is" (p. 19).

Perhaps the last point made in the above quotation, that educators cannot agree what constitutes an arts curriculum, offers enlightenment into the problems of arts inclusion in education. An examination of the relevant literature regarding arts in the schools reveals that arts educators cannot often agree as to the goals of arts education. Put another way, there has been relatively little discussion and even less agreement in the professional literature as to the **behaviors** that children who have been exposed to the arts in schools should demonstrate. While the stated goals of arts in education programs have included such terms as appreciation, valuing, well-rounded individual, and creative, such relatively nebulous and inexact terms have offered very little insight into how children who experience arts in the schools should think, behave, and perform in their educational and home environments.

The present study **began** by attempting to identify what attributes students who have experienced the arts might possess and how those attributes might be translated into **measurable behaviors**. Prior to any evaluation being carried out, this committee labored in trying to identify the academic, mental health, affective, and artistic behaviors that could be measured in order to ascertain the effects of an arts curriculum on student behaviors.

In doing this, it is believed that new research ground was broken in a variety of ways. First, hypotheses were created **a priori** on the effects of an integrated arts program on student behaviors. These hypotheses were constructed before the fact and were created in order to be empirically testable. Such a priori hypotheses are more in adherence with scientific principles than simply collecting data in a scientifically uncontrolled situation with no driving hypotheses. This latter technique only leads to conjecture **after** data have been collected that the arts

MIGHT have had an effect on students' lives.

Second, the formulation of hypotheses forced the evaluation team to precisely define the behaviors that would be tested. Thus, what was created was a set of independent variables, each of which was quantifiable, and could be tested in light of the created hypotheses.

Finally, the creation of a priori hypotheses forced the creation of a controlled and empirically based evaluation methodology. Groups had to be systematically defined and data collected in such a way that differences between the groups could be attributed (as much as possible) to the differential way children were treated in their educational programs. Thus, as much as possible, and realizing that all methodologies contain various degrees of error, differences between groups on the variables tested could be viewed as being related to or correlated with children receiving an integrated arts program in the schools.

The present evaluation study investigated the effects of one arts program in the schools (the **SPECTRA**$^+$ program) on children in three grades at two schools and in two school districts. In addition, two different control groups of children were utilized in the study to help insure that differences between the groups could be attributable to the educational programs (including the SPECTRA$^+$ program) that children were receiving in their classrooms. A priori hypotheses were formed and behavioral variables identified so that the effects of the SPECTRA$^+$ program on specific variables could be tested.

Since the SPECTRA$^+$ program was the one that was specifically adopted into the school curriculum and was the one that this evaluation study is based upon, it would seem imperative that the history, characteristics, and attributes of the program be described for the reader. What follows is a brief history and discussion of that program.

2. THE SPECTRA$^+$ PROGRAM

The SPECTRA$^+$ program is a four-year model arts education initiative being conducted in two elementary schools in southwestern Ohio. It developed as a primary goal of a comprehensive cultural action plan in Hamilton and Fairfield during 1990. Two city school districts are involved in the program. The Hamilton Fairfield Arts Association (HFAA) coordinates SPECTRA$^+$ and acts as its fiscal agent. HFAA also holds responsibility for the evaluation methodology and implementation.

SPECTRA$^+$ is based upon but is also qualitatively different from the arts education model known as the **Burgard A+** approach (Burgard and Associates, Wilmington, North Carolina). This A+ approach offers schools a formalized and centralized model for arts infusion in the school. Control of the curriculum as well as delivery of the arts in the schools is centralized and administered by those in charge of the given A+ program. This infusion concept is so vital to the model that the first A+ site in Augusta, Georgia, recently changed its program name to Arts Infusion.

The SPECTRA$^+$ program is unique in several ways. The first aspect of the program's uniqueness is that it is **site specific**. That is, planning and control of the program is generally in the hands of the SPECTRA$^+$ committee at each model site. Authority over the program is shared with the Arts Association, which is primarily responsible for artistic decision-making, fiscal management of the program, and grant writing. The SPECTRA$^+$ committee at each site consists of teachers, school administrators, artists, and, perhaps most importantly, parents. The Arts Association employs a coordinator who works two days per week at each school site acting as a liaison between the Arts Association and the model sites.

The second unique aspect of the program is in its comprehensive professional development component. This aspect of SPECTRA$^+$ includes intensive arts experiences for classroom teachers. This allows the classroom teacher to take meaningful arts experiences back to the classroom and use those experiences in order to teach academic concepts.

It is believed that the differences in autonomy allowed individual school sites in the SPECTRA$^+$ model discourages dependency on an outside arts organization. By allowing relative autonomy at school sites, it is anticipated that during the final year of the program school sites will completely take over the arts program without reliance on any outside administrative organizations. Thus a goal of the SPECTRA$^+$ program is to have the model sites eventually become completely autonomous and self-sustaining and to continue the arts program in a way that fits best into their own educational philosophy and goals.

Goals of the SPECTRA⁺ Program

The SPECTRA⁺ concept asks the model sites to place the arts in their school curriculum at a level equal in significance to the other academic subjects. A primary goal of the program is to attempt to achieve one hour of each school day dedicated to art, music, dance, drama, or media arts for each student. The purpose of this goal is to raise the arts to a curricular significance that emphasizes their importance to pupils.

The SPECTRA⁺ philosophy is NOT that the arts should be instituted into a significant position in the child's curriculum simply because the arts are "good" or beneficial for students. Rather, it is the position of the program that SPECTRA⁺ should result in children performing better in all aspects of school **including academic achievement**. Second, it is believed that the SPECTRA⁺ program will result in greater degrees of mental health on the part of students as measured by behaviors related to self-esteem, self-expression, and creativity. Finally, a major tenet of the SPECTRA⁺ program is that involvement in the program will result in increased and more positive relations between the schools and the community.

Principles of the SPECTRA⁺ Program

There are nine basic principles or components of the SPECTRA⁺ approach. They are:

1. Cognitive Shift
2. Expressive Presentation
3. Curriculum Renewal
4. Teacher Leadership
5. The Arts as Basic
6. Implementation
7. Content
8. Methodology
9. Evaluation

Cognitive shift involves intensive teacher training and includes all of the teachers at a given site. It is predicated on the belief that the arts embrace all aspects of schooling and are relevant to each child's curriculum independent of whether children choose to become artists as a vocation. Through observation of quality arts initiatives and ongoing exposure to professional artists and their works, teachers and administrators begin to think differently about how a child might best be educated.

Expressive presentation holds that the visual arts, music, dance, and drama should be **integrated** throughout the curriculum as well as taught individually as self-contained entities. It is believed that cognitive and linguistic development are accelerated and retention of material is improved through systematic delivery of academic subjects through arts experiences. One of the goals of the SPECTRA⁺ program is to help each child learn the importance of partnerships in problem discovery and problem solving while developing a strong self-esteem.

Curriculum renewal refers to the goal of SPECTRA⁺ that the curriculum not be fully planned and imposed from outside but rather that it emerges as a product of a symbiotic relationship among students, teachers, artists, parents, and community partners. Under the guidance of an arts agency staff, development of curriculum becomes an additive process that is continually evaluated and modified. Community input is a vital component of curriculum development since building the curriculum transcends the school environment.

Teacher leadership refers to the concept that the SPECTRA⁺ program aims to expand the traditional teacher role beyond facilitator of knowledge and places the teacher **next** to the child as a learning partner. This relationship creates role models for learning for students to emulate. As they begin to observe active learning, students adopt and apply some of the same characteristics demonstrated by their teacher. Simultaneously, expertise is shared with the children by their teacher. During the entire process, the teacher also becomes evaluator/researcher as he/she gathers data and information on each student and documents his/her findings. Concurrently, the teacher synthesizes information and events in order to create a new learning environment and a renewed school community. In order to accomplish these goals, teachers are given additional planning time and encouraged to reflect on their personal involvement as teacher/learner.

The Arts as Basic refers to the idea that the arts are a basic and fundamental means of expression and communication in the human condition. Long before humans could write or read, they drew, danced, and drummed. It is the position of the SPECTRA$^+$ program that this innate ability to express and communicate through art, movement, and music is slowly extinguished as students move through the public school system. One of the principles of the program is to reestablish these innate forms of communication back into the educational curriculum. The goal is not to create more artists but rather to develop more complete minds by balancing cognitive with artistic development.

Implementation refers to the idea that the SPECTRA$^+$ program is not a packaged model designed to be imposed on a school. Rather, it is a process of planning initiated and coordinated by an arts organization that begins with a broad-based committee composed of teachers, parents, administrators, artists, and community members. The dialogue generated includes discussion about educational mission, possible curriculum content, exposure to professional artists and their works, and the development of a collaborative framework for the approach. Each SPECTRA$^+$ site constructs its own educational framework with the arts at the core of the curriculum and as the universal theme throughout the school. An arts agency representative appropriately trained and specifically designated to the sites coordinates the SPECTRA$^+$ process. The broad-based committee ensures the development of an arts intensive framework that addresses the needs of each site.

Regarding **content**, the SPECTRA$^+$ program holds that the arts present a multitude of learning and teaching opportunities. The arts also provide expansive opportunity for the application of creative teaching approaches. With such flexibility and openness, the curriculum becomes a structured depository of ideas, creativity, and interest driven by the students, teachers, artists, parents, and other members of the school and community.

Methodology refers to the idea that classroom teachers learn about the arts through direct experiences. The teachers then transpose these experiences and use them in the classroom after joint planning with staff artists and arts specialists. Professional artists are placed on staff for long-term residencies. Short-term residencies are ongoing throughout the school year with a variety of disciplines in the arts represented. Artists and teachers collaborate to explore teaching methods that synthesize academic concepts and quality arts experiences.

Evaluation refers to the idea that any program should stand or fall by its success or failure. Likewise, success of a program in achieving its goals can only come about by systematic evaluation. For that reason, the SPECTRA$^+$ program was one of the first in devising a comprehensive and sophisticated empirical evaluation study.

The goal of evaluation in the SPECTRA$^+$ model is to be both **formative and summative**. Summative evaluation refers to whether SPECTRA$^+$ has made progress in reaching its stated goals and whether significant improvement in children's scholastic and affective functioning has taken place as a result of the program. Thus, summative evaluation, at least in part, deals with questions referring to whether the SPECTRA$^+$ program should be continued.

Formative evaluation refers to ways that the SPECTRA$^+$ program can be improved regarding the daily interactions of the program in children's lives. Formative evaluation is thus ongoing and is concerned less with continuation issues for the program and more with internal program improvement for better service delivery.

3. CONCLUSION

What follows is an empirical evaluation of the SPECTRA$^+$ program as outlined in the ninth principle of the program discussed in the above section. The program was designed, carried out, and prepared by an outside evaluator with no ties to either the Hamilton Fairfield Arts Association or to the SPECTRA$^+$ program. The evaluator in this study holds a Ph.D. in Educational Psychology and possesses extensive experience in research design and evaluation. It was the goal of the SPECTRA$^+$ program to initiate an objective, well-planned, and empirical study designed to assess the success or failure of the program in improving the educational and affective goals of children. Hopefully, the objectivity, empirical, and methodological attributes of the study will be demonstrated in the following three chapters.

CHAPTER TWO

METHODOLOGY

INTRODUCTION

Any research or evaluation project is only as good as its design and methodology. Put another way, a project that possesses a flawed design cannot be saved later by sophisticated statistical procedures or data manipulations. Thus, it was considered absolutely crucial that the design and methodology of the present project be as straightforward, sound, and unflawed as possible. For this reason, the majority of the time spent in the initial stages of the evaluation project went into planning the design, and it is considered crucial that the reader of this report understand the design and methodology, which are the cornerstones of the evaluation project.

This chapter represents an attempt to discuss in detail the design, methodology, and data analysis procedures that made up this evaluation. The chapter describes how students were recruited and chosen and the procedures used to acquire sound and nonbiased data. It also includes a discussion of all of the research instruments used in the study, a description of their technical soundness, and a description of how data from these instruments were analyzed.

Also included in this chapter are brief discussions of the statistical procedures used in data analysis and the underlying statistical assumptions of those procedures. While this chapter is not meant in any way to be a discourse in statistical methods, a brief discussion of how certain statistics are used and the underlying assumptions behind those statistics is necessary for understanding the results of the study.

1. SUBJECTS

This study was empirical in nature rather than ethnographic (descriptive) or single-subject. Empirical studies seek to look at differences between groups in order to investigate the possibility that such differences are correlated or related to the experimental variables. In looking at the differences between groups, scores of individual subjects are not used as the basis of analysis. Rather, the **MEAN** or arithmetic average of the groups is used.

In any empirical study, it is considered crucial that a large number of students be utilized. This is important due to a statistical concept known as the **CENTRAL LIMITS THEOREM**. This theorem posits that a large number of students in each experimental group are needed so that the group means will not be unduly influenced by any individual score. For example, consider a group of three people whose scores were 5, 10, and 75, respectively. It can be seen that the mean of this group is $90 \div 3 = 30$. Furthermore, it can readily be seen that the score of 75 increased the mean of this group significantly. Thus, to make any conclusions about this group based upon its mean would be erroneous. However, if the number of people in the group had been increased to 100 rather than 3, the disproportionately high score of 75 would have only thrown off the group distribution by 1/100th.

Second, the central limits theorem insures that a **REPRESENTATIVE** sample has been obtained. By way of example, consider an investigator who wishes to measure the height of males at a given university. If this person only took measurements in the vicinity of a basketball court, he/she might obtain an unrepresentative sample of people 6'6" tall or taller. However, if the investigator measured 2,000 people, obtained from individuals standing in front of the student union, he/she might get an occasional 7' tall person and the occasional 4' tall person, but most people would fall into the normal range of height. Thus, the central limits theorem requires both a large and a representative sample of subjects in the study.

The final reason for using a large sample has to do with subject **ATTRITION**. In any design that occurs over a period of time and in which subjects are going to be tested on a number of occasions, some students will exit the study due to life circumstances. In an educational study such as this one, those circumstances usually revolve around children moving away and thus leaving the school that was participating in the study. In studies such as this one, student attrition rate can range anywhere from 10% to 30%. While attrition rate is a fact of life and usually cannot be avoided, it can be anticipated by recruiting and utilizing a large number of students in order to insure

adherence to the Central Limits Theorem throughout the life of the study.

In the present study 615 students were recruited and employed. To the evaluator's knowledge, this represents the largest sample size of any evaluation study carried out with children regarding an arts program in the schools.

Table 1 shows the breakdown of the sample size by gender, grade, and condition (the experimental conditions will be explained in a subsequent section of this chapter). As can be seen from this table, the sample size for each gender, grade, and condition group was both large and approximately equal in size.

TABLE 1

SUBJECT POOL BY GENDER, GRADE, AND CONDITION

	Grade 2		Grade 4		Grade 5	
Condition	Boys	Girls	Boys	Girls	Boys	Girls
SPECTRA$^+$	29	37	36	42	34	36
Modified control	30	27	26	38	44	38
Full control	31	41	29	30	31	36

Subject Recruitment

Students were recruited from four elementary schools in two cities. These two cities adjoin one another in the southwest corner of Ohio and contain similar demographics. Each city contains a population between 40,000 and 100,000 persons and both possess a strong mix of white-collar and blue-collar workers. Both cities possess an industrial and service economy mixture and both possess many of the problems facing middle-sized cities in the United States in general.

Table 2 shows the relative demographics for each school district as well as the demographics for the four individual schools. In this table, two terms may be unfamiliar. The term **Relative Wealth Indicator (RWI)** refers to the percentage of school-aged children within the school district boundaries who have a family income **greater** than that defined as poverty level by the U.S. Department of Education. The term **Discretionary Dollars per Pupil (DDP)** represents budgeted expenditures for instruction by the school district obtained from the Bureau of the Census. DDP is categorized by the Bureau of the Census as **low** (less than $200 per pupil), **medium** ($200-$400 per pupil), or **high** (above $500 per pupil). Note that the demographic information contained in Table 2 is for school districts rather than individual schools. Such information for individual schools was not available to the evaluator.

It should be pointed out that these schools were not chosen at random by the evaluator. In both Districts A and B, a school had applied to participate in the SPECTRA$^+$ program (Schools 1 and 3). When this selection process took place, the task fell to the evaluator to find a comparable school within each district to act as a demographic control. That this was relatively accomplished may be seen by comparing the demographics of School 1 with School 2 and School 3 with School 4.

Children in the schools were eligible to participate in the study if they were enrolled in grades 1, 3, or 4 **at the time of the onset of the study**. This means that at the time of post-testing one year later, students were enrolled in grades 2, 4, and 5, respectively. These grades were chosen so as to yield developmental results among children at a variety of chronological ages.

ERRATA

Table 2 on page 7 and Table 3 on page 9 have the letter identifiers of the school districts inadvertently reversed. This sheet contains the corrected tables.

TABLE 2

DEMOGRAPHICS OF SUBJECT POOL

Demographic	District A	District B
Enrollment	8,349	10,740
Relative Wealth Indicator (RWI)	93%	83%
Discretionary Dollars per Pupil (DDP)	Medium	Medium
Percent minority	5%	11%
Population		
School 1 (District A)	1,200	
School 2 (District A)	1,000	
School 3 (District B)		455
School 4 (District B)		545

TABLE 3

CONDITIONS WITHIN SCHOOLS

	Condition		
School	SPECTRA+	Modified control	Full control
1 (District A)	X		
2 (District A)		X	
3 (District B)	X		
4 (District B)			X

TABLE 2

DEMOGRAPHICS OF SUBJECT POOL

Demographic	District A	District B
Enrollment	10,740	8,349
Relative Wealth Indicator (RWI)	83%	93%
Discretionary Dollars per Pupil (DDP)	Medium	Medium
Percent minority	11%	5%
Population		
School 1 (District A)	455	
School 2 (District A)	545	
School 3 (District B)		1,200
School 4 (District B)		1,000

Children in the study who were identified by school districts as receiving special education services were allowed to participate in the study along with their classmates in order to mitigate against these pupils becoming ostracized or labeled by peers. However, such students were eliminated from data analysis and did not count toward contributing to the subject pool. The special education students were not included in the data for two reasons. First, it was believed that they might yield results that were qualitatively different than the nondisabled students and thus skew results in some unknown direction. Secondly, standardized academic achievement test data for these children were not available for both districts since the districts do not regularly test students enrolled in special education courses on standardized achievement tests.

All children qualifying for participation in the study were given parental permission slips for their parent(s) or guardian(s) to sign. Children who did not return signed permission slips did not participate in the study. In addition, there were parent/evaluator meetings held during evening hours for parents who had questions or concerns about the study.

2. EXPERIMENTAL CONDITIONS

In this study there were three experimental conditions. These consisted of SPECTRA$^+$, a Modified Control (hereafter referred to as Modified), and a Full Control group (hereafter referred to as Full). Each condition is described below.

SPECTRA$^+$ Condition

The SPECTRA$^+$ condition represented the experimental condition in the design. It entailed a program in which both classroom teachers and professional artists serving in long-term and short-term residencies presented the arts to students through direct experiences. Artists and teachers worked in a collaborative program to explore and synthesize academic concepts and quality arts experiences. The arts curriculum is seen as being an integrative and important component of the child's academic curriculum. The SPECTRA$^+$ program is explained in greater detail in Chapter One.

Modified Control Condition

Many research designs often contain only an experimental and a full control. However, this does not compensate for a phenomenon known as the **HAWTHORNE EFFECT**. The Hawthorne Effect refers to the well-documented finding that experimental groups sometimes perform better than control groups by virtue of the fact that they are getting something new, different, and stimulating while the control group receives nothing new or novel in their educational environment. Thus, the Hawthorne Effect posits that an experimental group might perform better than the control group under ANY conditions in which they received novel and new curriculum, and it is the act of

newness rather than the experimental variables (i.e., the SPECTRA$^+$ program) that is responsible for any differences between the groups.

For this reason, the current design utilized a Modified Control group. This group received something new and different in their educational program, but these new stimuli did not consist of the SPECTRA$^+$ program. The children in the Modified Control condition received an innovative program funded under two grants provided to School District B. In this school, children received the following innovations in their regular school program:

1. Instruction in a cooperative learning environment.
2. A curriculum in which students were NOT grouped by chronological age but by achievement in mastering certain skills. Students consistently moved in and out of classes with different teachers as they mastered learning objectives.
3. Additional equipment including playground equipment.
4. Instruction on noncompetitive games as well as a unit on conflict resolution.
5. "Family" math in which math taught in school was reinforced by the family and math instruction took on "real-life" dimensions.
6. A "whole learning" curriculum that strongly involved parents in the educational process.
7. Alternative report cards that emphasized narrative assessments rather than grades.
8. A program in which children were exposed to leisure-time activities such as hobbies and interests.
9. A behavior incentive program that rewarded appropriate behavior by allowing children to explore their interests.

It is believed that these as well as other innovations that occurred at this school qualified these children to be included as the "Modified Control" group. Inclusion of children in this school into the experimental design was allowed in order to test for the Hawthorne Effect. Since BOTH SPECTRA$^+$ and the children in the modified condition were receiving something new and different in their educational programs, the Hawthorne Effect would predict no differences between these groups on the variables measured in the evaluation study. Likewise, any differences between these two groups would mitigate against the Hawthorne Effect and would point to real differences between the groups based upon the program that each was receiving.

Full Control Condition

The Full Control group was a traditional control group in which students received no experimental or new program but rather received the traditional curriculums that were being offered by their school systems. Children in this group received their normal curriculum that might or might not include an arts curriculum and other innovations in the classroom. However, in this group, students were considered to constitute a full control group because they did not receive anything **SPECIAL** as defined either by the SPECTRA$^+$ or innovative (modified) curriculums.

It should be noted that the conditions of the study were **NESTED** within schools. That is, due to the nature of the agreement between the school systems and the Arts Association, certain schools received the SPECTRA$^+$ program or the innovative (modified) program and certain schools did not. In a perfect design, all children in the study would have been randomly assigned to one of the three conditions regardless of the school they were attending, but within the realistic world of the way schools and school districts operate this was impossible. Rather, the evaluator had to work with the programs as they were contracted to operate within individual schools. Table 3 shows how conditions were nested within the four schools.

TABLE 3

CONDITIONS WITHIN SCHOOLS

School	Condition		
	SPECTRA+	Modified control	Full control
1 (District A)	X		
2 (District A)			X
3 (District B)	X		
4 (District B)		X	

3. *EXPERIMENTAL INSTRUMENTS*

In the evaluation study five main areas or variables were measured using six instruments. Table 4 shows the five areas investigated along with their corresponding evaluation instruments.

TABLE 4

VARIABLES TESTED WITH CORRESPONDING RESEARCH

Variable tested	Instrument(s) used
Self-esteem	Culture-Free Self-Esteem Inventory
Locus of control	Bialer-Cromwell Locus of Control Scale
Creative thinking	Torrance Tests of Creative Thinking
Appreciation of the arts	The Arts Appreciation Scale
Academic achievement	Iowa Tests of Basic Skills Stanford Achievement Tests

Culture-Free Self-Esteem Inventory

The Culture-Free Self-Esteem Inventory (Battle, 1981), Form A (referred to henceforth as the SEI), is an instrument designed to measure the self-esteem of children. There are two forms of the instrument: a 60-item and a 30-item form. In the present study, the 30-item form was used. The 30-item form was chosen because of concerns of student fatigue given all of the measures that were to be collected from students. The SEI takes 10 to 15 minutes to administer.

The SEI measures children's self-esteem in relation to peers, school, and home. Students are asked to check "yes" or "no" to questions on the scale that are designed to measure levels of self-esteem. The inventory yields a total self-esteem score as well as "domain" (subscores) scores that include general, social/peer, academic/school, and parental/home self-esteem.

A unique feature of the SEI is the **Lie** items. These items are included to indicate students' levels of defensiveness and/or degree of honesty in how they responded to questions. Examples of Lie items include: "I am always happy," "I like everyone I meet," and "I am never angry." It is assumed that the majority of the population would respond a certain way to these questions. That is, most people are not always happy, do not like everyone they meet, and are sometimes angry. Thus if children respond to a number of these Lie items "inappropriately," it is indicative that they are not answering honestly or are hiding their true feelings. Although these items are not used toward the

calculation of self-esteem scores, they are used to discard a child's SEI from the subject pool if that child answers a number of these Lie items inappropriately.

The reliability and validity estimates of the SEI may be seen in Table 5. The SEI was standardized on a sample of males and females enrolled in grades three through nine who were enrolled in schools across the United States and Canada. As can be seen from this table, the reliability coefficients for the total test and for the subscores are in the acceptable range and compare favorably to other measures of self-esteem.

TABLE 5

RELIABILITY AND VALIDITY INFORMATION REGARDING THE CULTURE-FREE SELF-ESTEEM INVENTORY

	Subscale				
Reliability	Overall	General	Social	Academic	Parental
Test-retest correlations for grades 3-6	.81-.89	.61-.76	.60-.76	.46-.71	.52-.67
KR-20 (internal reliability) correlations for grades 7-9	.88-.96	.71	.67	.66	.76
Concurrent validity with . . .					
Coopersmith Self-Esteem Inventory	.71-.82				
Battle's Teacher Behavior Rating Form	.32-.39				

CONTENT validity refers to the idea that the test adequately measures what is considered to be the content that makes up self-esteem. Reviews of the content validity of the SEI indicate that the test adequately measures the perception that the individuals possess of their own self-worth (Mitchell, 1985) and that it adequately covers all aspects of the construct of self-esteem (Battle, 1981).

Another type of validity is known as CONCURRENT validity. This is predicated on the assumption that if Test A has been already judged to be valid and Test B is strongly and positively correlated with Test B, then Test B is also valid. The Coopersmith Self-Esteem Inventory is considered to be a highly valid assessment instrument for measuring self-esteem. As can be seen from Table 5, the SEI strongly and positively correlates with the Coopersmith measure, thus contributing to the validity of the SEI.

Bialer-Cromwell Locus of Control Scale

The Bialer-Cromwell Locus of Control Scale (Bialer, 1961; hereafter referred to as the B-C) was used to measure children's locus of control. The B-C is a 23-item, "yes-no" questionnaire that measures the extent to which a child construes outcomes as being consequential to his/her own actions (i.e., internally controlled) rather than due to the whims and/or manipulations of fate, chance, or other people (i.e., externally controlled).

The B-C is generally the locus of control scale of choice with children and has been used extensively in the research literature since its creation in 1961. The test-retest reliability of this instrument (given seven days apart) has been found to be .87, which is remarkably high for a test of this nature. The B-C was also tested for RESPONSE SET. This is defined by the child's tendency to answer all of the questions the same way regardless of whether they are worded positively or negatively. The response set for the B-C was found to be low, which was the desirable state for a test of this type. Finally, the B-C has been found to contain both content and concurrent validity when measured against the construct of locus of control as well as against other measures that measure the construct.

Torrance Tests of Creative Thinking

The Torrance Tests of Creative Thinking (Torrance, 1962, revised 1990) are a set of multiple-task, paper-and-pencil measures devised to assess five aspects of creative thinking: **fluency, flexibility, originality, resistance to closure,**

and elaboration. The tests yield standard scores and percentiles as individual test takers are compared with the test norm group.

Several studies regarding the technical quality of the Torrance Tests are reported. Since the scorings of the tests are somewhat difficult and subjective, a test of interrater reliability is important. In one study, a set of classroom teachers who had studied the scoring guide showed average interrater reliability ranging form .88 to .96 on the figural tests used in the present evaluation. This means that scorers tended to score the test similarly. In the present evaluation study, interrater reliability was also assessed. Two scorers were used for the pre-test and post-test conditions. For each condition, the raters received a one-day seminar on scoring. Each rater scored the same 20 student tests. For the pre-test condition, interrater reliability was found to be .92, and for the post-test condition it was .94. This indicated an extremely high degree of agreement between the scorers on scoring student Torrance Tests.

The test-retest reliability of the Torrance Tests has also been assessed in past studies. Most of the studies report reliabilities in the .60s and .70s. This is well within the acceptable range for a test like the Torrance for which scoring is somewhat difficult.

The validity of the Torrance Tests has also been evaluated in past studies. In fact, to this date, over 50 studies investigating the construct, concurrent, and predictive validity have been carried out. These studies suggest that the Torrance Tests possess adequate concurrent and construct validity and what the tests measure is consistent with what experts consider creative behavior.

The data on predictive validity are somewhat more obscure and controversial. However, the purpose of the present evaluation was not to predict future creativity based upon Torrance Tests results in the present. Thus, based upon the available data, the Torrance Tests were judged to possess adequate validity needed to assess creativity for the present study.

Arts Appreciation Test

An extensive review of the literature revealed that there are almost no available instruments that assess appreciation of the arts in children and adolescents. In fact, the review of the literature turned up only two such instruments: the Arts Assessment Program (Manitoba Department of Education, 1988) and the Second Assessment of Art. It was concluded that neither of these tests were by themselves an adequate measure to administer to the children in the present study. For that reason, a hybrid instrument of questions judged to be appropriate from each instrument was selected and merged into a new instrument entitled the Arts Appreciation Test (AAT). This instrument is a 17-category, 61-item, Likert-type scale in which students respond **yes (or agree), no (disagree), or don't know**.

The AAT was designed to measure total appreciation of the arts as well as appreciation and valuing of different arts activities both in and out of school. Table 6 lists the values of students regarding the arts contained in the AAT.

TABLE 6

VALUES MEASURED BY THE ARTS APPRECIATION TEST

1. Total arts appreciation.
2. What is good art? (Ten questions)
3. What can be considered works of art? (Five questions)
4. Which materials have you used in school? (Eleven questions)
5. Which activities have you done in school? (Eleven questions)
6. Do you enjoy looking at this picture?
7. How often have you visited an art museum or gallery, attended a concert, or watched dance or ballet? (Three questions)
8. Would you like to visit an art museum, attend a concert, or watch a dance or ballet? (Three questions)
9. Outside of school which of these activities do you like to do? (Eleven questions)
10. What should a work of art do? (Four questions)

Academic Achievement Measures

Students' academic achievement was measured by two standardized instruments: the **Iowa Tests of Basic Skills** and the **Stanford Achievement Tests**. Both tests are the most used and technically adequate group standardized achievement tests in the field with well proven reliability and validity. Likewise, over the years both tests have become the norm for school achievement tests used by schools.

The choice of these tests for the present study was outside the decision-making scope of the evaluator. Rather, each school system made the decision years prior to the evaluation study to test all of their pupils either on the Iowa or the Stanford Tests. The use of each test was nested within each school district. That is, one district continues to use the Iowa Tests while the other has used the Stanford Tests over the years. Likewise, in each district, not all pupils are administered the tests each year. Rather, within districts children at certain grades have historically been administered their particular set of achievement tests. This led to some problems of data analysis that will be described in a subsequent section of this chapter. However, wherever possible, the appropriate test scores were used for each student when the scores were available in the child's cumulative file.

Both the Iowa and the Stanford Tests yielded a set of reading scores that were used in the data analysis for pupils. The reading scores used in the evaluation study were **total reading, reading vocabulary, and reading comprehension** (both standard scores and percentiles were recorded for each reading subscore). Where mathematics scores were available for pupils, **total mathematics, math application, math comprehension, and math concepts** scores were used (standard scores and percentiles).

Why These Variables Were Chosen

These five variables were chosen for a variety of theoretical and practical reasons. The first set of variables chosen to be tested was **academic achievement**. Much of the value of the SPECTRA$^+$ program is predicated on the belief that exposure to a structured and regular program of arts in the school will result in improved academic achievement on the part of students. Unfortunately, much evidence offered to substantiate this belief has been based upon anecdotal records or assumptions that a program of the arts in the schools SHOULD improve academic achievement. Likewise, any empirical evidence offered has often centered around classroom teachers' reports that children are doing better in school and that such improvement appears to be linked to the arts program.

However, what is almost completely lacking in the literature is any **empirical** data investigating in a controlled study the effect of an arts program on children's academic achievement. The current evaluation project attempted to investigate this question in a scientific manner by applying two controls. First, it utilized three experimental conditions: the SPECTRA$^+$ group and the two different control groups (these groups were discussed at length in the previous section on the experimental conditions). By engaging three groups, it was possible to scientifically measure the degree of improvement in academic achievement as a function of involvement in the arts. Second, standardized achievement test scores were used for measuring achievement rather than teacher grades or anecdotal records. This procedure eliminated any bias effects that teachers might have had in their grading of students who were enrolled in one condition or another.

The second variable measured was **self-esteem**. It was believed that engaging in an arts program in the schools would help children feel better about themselves and give them a strong sense of self-worth. It was hypothesized that expressing oneself through the arts would lead to a higher degree of self-understanding and hence self-esteem.

The third variable tested was **creativity**. It seemed intuitively obvious that involvement in the arts in the school would help one become more creative and original in one's everyday life. However, it is a scientific truism that what is intuitively obvious does not always translate into scientific fact. Hence, it was deemed important that creativity be investigated as being affected by involvement in the arts program in the school.

The fourth variable tested was **locus of control**. It was hypothesized that succeeding at the arts would help children feel that they had direct control over what happened in their lives. They would feel more self-directed and less controlled by others or by luck or fate. This hypothesis was completely intuitive on the part of the evaluator. To date, there has been no investigations of the effects of involvement in the arts on one's locus of control.

The final variable chosen was **appreciation of the arts**. Of all the variables selected, this one seemed most intuitively obvious. Being involved in the arts in the school should make one more empathetic and receptive to the arts. However, like all hypotheses, this one needed to be scientifically tested.

4. PROCEDURE

Pilot Study

A pilot study was carried out with a total of 77 students enrolled in three elementary school grades. Children were administered the SEI, Locus of Control Scale, the AAT, and the Torrance Tests in order to ascertain their ability to understand the questions and complete the task in the time allotted. The pilot study was carried out over a two-day period for each child.

It was found that students had no difficulty with the SEI, the Locus of Control Scale, and the Torrance Tests. For all the tests, it was found that if proctors were used in each classroom in addition to the experimenter and the teacher, all of the children could keep up with the task. Furthermore, students easily understood the questions. It was decided not to have students use scanner sheets but rather to have them mark their answers directly upon their test booklets. This was done to eliminate any confusion and/or error that might have arisen in students' transferring answers to questions onto scanners or appropriately filling in the scanner grids with their pencils. Their answers were then transferred to scanner sheets by an adult at a later date.

The students experienced some problems in understanding all of the questions on the AAT. Based upon observations of students, as well as interviews with students and teachers, the language of some of the questions of the AAT was modified so as to be more easily understandable for younger students.

Main Study

For both the pre-test and post-test periods, testing was spread out over a two-day period for each child. On the first day, students received the SEI and the AAT. On the second day of testing, students received the Locus of Control Scale and the Torrance Tests. The SEI and the Locus of Control Scale were separated in administration by a day because it was felt that these two constructs were the most correlated (related) of the four measures used and that by separating their administration over time any confounding effects of each measure on the other could

be lessened.

For all administrations, students were tested in their regular classes during the school day. An experimenter read each question to the students and students were instructed to answer only that question without skipping ahead or going back to answer questions previously encountered. Besides the experimenter, the teacher and at least one proctor also remained in the room to circulate around the room and help students if any difficulties or questions arose. In all circumstances, the testing time for each session was 30 to 45 minutes.

5. DATA PREPARATION

The first task that needed to be accomplished was that all data had to be transferred to Scantron sheets. Four separate files were then read into the computer for each subject: pre-test data for the SEI, Locus, AAT, and Torrance Tests (referred to hereafter as Pre-arts); post-test data on the SEI, Locus, AAT, and Torrance Tests collected one academic year later (known as Post-arts); and pre- and post-test academic achievement test score data as contained in the child's cumulative folder.

Pre-arts data were collected prior to students participating in the SPECTRA$^+$ program or the innovative (Modified Control condition) program. Post-arts data were collected one academic year later after the students had spent one year in each program. Pre-academic achievement data were collected for the academic year prior to the child's entering the SPECTRA$^+$ or innovative (Modified condition) programs. Post-academic achievement data were collected for the school year in which the child completed his/her first academic year in his/her respective program. Thus, all of the pre-test data were collected in the spring of 1992 and all of the post-test data were collected in spring, 1993. The pre-academic achievement data covered the 1991-92 school year, and the post-academic achievement data covered the 1992-93 school year.

The key concept regarding data analysis in the present evaluation study revolved around the idea of DIFFERENCE SCORES. Difference scores consist of the difference (subtraction) of pre-test from post-test scores on each variable analyzed. Such difference scores represent the magnitude or degree of improvement that each student made from pre-test to post-test as a function of experimental condition (SPECTRA$^+$, Modified Control, or Full Control). A child's difference score would be in the positive direction if his/her post-test score was greater than the corresponding pre-test score on a given variable. A score in the negative direction represents a decline in performance on that variable from pre- to post-test.

6. STATISTICAL PROCEDURES

The purpose of this chapter section is not to deliver a discourse on statistics and statistical analysis. Nevertheless, a discussion of the statistical tools used in this evaluation study and the underlying assumptions behind those tools is necessary for an understanding of how data were analyzed.

The statistical procedure used through the study was the Analysis of Variance Test (ANOVA). An ANOVA is a procedure in which the data are partitioned into groups known as **INDEPENDENT VARIABLES**. The independent variables in the evaluation study were grade (three grades), gender (males and females), and experimental condition (SPECTRA$^+$, Modified Control, and Full Control groups). The variable that is being investigated in the ANOVA (e.g., self-esteem) is known as the **DEPENDENT VARIABLE**. The dependent variable is analyzed as a function of the independent variables to see whether differences (known as **MAIN EFFECTS**) exist. This is accomplished by investigating the means (averages) of each of the independent variable groups against one another to see if these differences are statistically significant.

Sometimes, however, one independent variable can affect or **INTERACT** with another. For example, consider a case in which an advantage for the SPECTRA$^+$ condition was found for a certain variable (e.g., self-esteem) but this advantage did not hold up over all **grade levels**. In such a situation, children in the SPECTRA$^+$-2nd grade condition may have made large self-esteem gains but similar gains were not found for the SPECTRA$^+$-5th grade children. Thus, interactions between independent variables serve to modify the effects that a given independent variable might have on self-esteem. While it is "cleaner" and easier to understand when such modifying interactive effects do not exist, it is a fact of experimental (and real) life that such modifying effects do often occur and are indicated by data analysis.

In the present evaluation, there were three independent variables: Condition (SPECTRA$^+$, Modified Control, and Full Control), Gender (male, female), and Grade (2nd, 4th, and 5th at time of post-testing). Hence a number of interaction or modifying effects exist. These include Condition X Grade, Condition X Gender, Grade X Gender, and the "triple" interaction of Condition X Grade X Gender.

The ANOVA procedure is predicated on some major statistical assumptions that must be in place for the data analysis to be valid. That is, while an ANOVA of any data set is physically possible, an analysis when the statistical assumptions have been violated is meaningless and misleading. It is one of the major tasks of the evaluator to make sure that the following statistical assumptions are in place.

A. The **CENTRAL LIMITS THEOREM** has been followed. This theorem was discussed in the SUBJECTS section of this chapter. Basically, the theorem asserts that the sample size must be large and that it is representative of the population being studied. Both of these conditions were followed in that the sample size was over 600 and children in each condition had an equal chance of being allowed into the study (i.e., subject selection was random within condition).

B. The statistical variances of the populations used are roughly equal. This term is referred to in statistics as **HOMOGENEITY OF VARIANCE**. While a discussion of the underlying concepts of homogeneity of variance is beyond the needs of the present evaluation report, the evaluator investigated the issue and found that homogeneity of variance was present in the present study.

The ANOVA procedure reveals whether groups are **SIGNIFICANTLY DIFFERENT** from one another. Statistically significant differences refer to the idea that group performances are so different that the evaluator is **AT LEAST 95% CERTAIN** that such differences could not have occurred by chance. Any differences lower than the 95% minimum criterion for statistical significance are rejected as being inconclusive. From the conservativeness of the 95% criterion, it can be seen that other large differences (e.g., 90%), while being intuitively conclusive, are rejected as nevertheless being too low for statistical conclusions to be made. Thus, the reader of the evaluation report can feel relatively assured that any differences between groups reported as significant are in reality actual differences correlated with the research design since they were reported in this study as significant only if they reached the 95% significance level.

While the ANOVA analysis reveals **WHETHER** there are significant differences between the groups as a function of the independent variables, it does NOT tell **WHERE** those differences lie when significance is found. Put another way, the ANOVA procedure reveals whether differences between the groups do or do not exist. When such statistically significant differences are found, the procedure does not reveal which groups were different from which other groups. To find which groups were significantly different, another set of analyses known as **POST-HOC analyses** must be carried out.

There are a number of available post-hoc statistical analyses. These include the STUDENT NEWMAN-KEULS, the DUNCAN, the LEAST SQUARES METHOD, and the TUKEY procedures. Each of these tests differs in its level of conservativeness, but each test is highly selective and conservative in nature and each takes the 95% level of significance criterion in assigning statistical significance to differences between groups.

In summary, the present evaluation sought to guarantee that the basic assumptions necessary for experimental design and statistical analysis be satisfied, and these conditions were found to be in place. At that point, data were analyzed using the analysis of variance procedure with **condition, grade, and gender** being the independent variables. Finally, significant differences found through ANOVAs were further analyzed using appropriate post-hoc analyses to ascertain where differences between groups existed.

CHAPTER THREE

RESULTS

INTRODUCTION

This study investigated differences between the groups on variables of self-esteem, locus of control, appreciation of the arts, creativity, and academic achievement (please see Chapter Two for a discussion of these variables). For each of these variables, data were analyzed in terms of experimental **condition** (SPECTRA$^+$, Modified Control, or Full Control; for a discussion of these please see Chapter Two), the child's school **grade** placement (2nd, 4th, or 5th at the time of post-testing), and **gender**.

The variables of condition, grade, and gender are known as **INDEPENDENT VARIABLES**. The purpose of any research design is to ascertain whether one or more of the independent variables are related to a change in the dependent variable(s). In the case of the present evaluation, the dependent variables were creativity, academic achievement, self-esteem, locus of control, and appreciation of the arts.

For any given dependent variable under investigation (e.g., self-esteem), it is possible to find significant differences among the three experimental conditions, among grades regardless of the experimental condition or gender, or between the two sexes independent of experimental condition or grade. For example, analysis of the data might show that for a dependent variable such as self-esteem the SPECTRA$^+$ group showed the greatest degree of improvement followed by the Modified Control group and the Full Control Group, respectively. This finding would hold regardless of grade or gender. Such a finding would constitute a main effect for **condition**. Likewise, suppose that instead of a condition effect, it was found that over all conditions, 5th grade students scored higher on self-esteem than 4th grade students who scored better than 2nd grade pupils. This would then be interpreted as main effect for **grade**. Finally, it might be found that regardless of experimental condition or grade, boys scored higher on self-esteem than girls. This would be a main effect for **gender**.

However (and as was discussed in Chapter Two), sometimes one independent variable can modify or **INTERACT** with another. As an example, consider a case for self-esteem where there was an interaction between Condition and Gender. In such a case, it might be found that while SPECTRA$^+$-Girls scored **highest** on self-esteem, SPECTRA$^+$-Boys scored **lowest**. Likewise, it could be found that the Full Control-Boys scored second highest, while Full Control-Girls scored second lowest. Thus, what is indicated in an interaction is a situation where one independent variable main effect has been modified by another.

While "pure" main effects are easier to understand and are more desirable, interactive effects are a part of research and real life. That is, it is reality that one independent variable may be affected and/or modified by another. In such cases, while the interaction effects are somewhat more confusing and modify the results, they must be reported and considered in order to make the evaluation study valid. In fact, statistical procedures mandate that significant statistical interaction effects supersede simple and main effects, and it is the interactive effects that must be considered and reported.

As was discussed in Chapter Two, the primary statistical procedure used in this study was the Analysis of Variance test (ANOVA). The ANOVA procedure judges whether there are statistically significant differences (main effects) between independent variables (i.e., condition, grade, or gender groups). However, even when such differences are found, the ANOVA procedure does NOT indicate **WHICH** groups are significantly different from one another. This is accomplished by the post-hoc procedures (Newman-Keuls, Duncan, Least Squares Method, and/or Tukey tests) discussed in Chapter Two.

The issue of **levels of confidence** was also discussed in Chapter Two. The accepted minimum level of confidence in science is the 95% level. This means that the experimenter can be certain with at least 95% confidence that the statistical differences between groups are "real" and did not occur by chance. For both the ANOVA and post-hoc procedure, the 95% minimum level of confidence has been adopted throughout this evaluation study.

Finally, it is important to keep in mind that all of the data discussed in this chapter represent **DIFFERENCE** scores. That is, what is being analyzed are the differences between post-test measures and pre-test measures for each variable measured. Thus, cases where group mean (average) difference scores are reported as a negative number reflect those situations in which children performed better on the pre-test than on the post-test.

1. CREATIVITY

All students were administered the Torrance Tests of Creative Thinking in pre- and post-test conditions. These tests yield a **total creative thinking** score as well as subscores in the areas of **fluency, originality, abstractness of titles, elaboration,** and **resistance to premature closure**. The total score and subscore results are presented below.

Total Score

The total score represents an index of **total creative thinking summed over the five subtests**. On total creative thinking, as expressed in improvement between pre- and post-test, a difference among the three **Condition** groups was found (99% level of confidence). Table 7 contains the ordered mean difference scores (lowest to highest) for the three condition groups. As can be seen from Table 7, there were large differences in favor of the **SPECTRA$^+$** group. The SPECTRA$^+$ group differed from both other condition groups at the 99% level of confidence.

TABLE 7

ORDERED MEAN DIFFERENCE SCORES FOR TOTAL CREATIVE THINKING BETWEEN THE THREE CONDITION GROUPS (PERCENTILES)

Condition	Mean difference score
Full control	3.37
Modified control	4.23
SPECTRA$^+$	15.54

Fluency

The fluency score is the number of ideas a person expresses through interpretable responses made to a given stimulus. It is predicated on the notion that a creative person is one who can generate (brainstorm) many different responses to a set of stimuli. On this subscore there were **no differences** between any of the groups.

Originality

The concept of originality is based upon the statistical infrequency or unusualness of a person's response. The concept is not concerned with the number of responses, as in fluency, but rather with the **novelty** of those responses.

On the variable of originality, there were significant differences between the **Condition** groups (99% level of confidence). Table 8 contains the ordered (lowest to highest) mean difference scores for the three condition groups on the variable of originality. As can be seen from Table 8 there was a large degree of improvement made by the **SPECTRA$^+$** students as compared to the Modified Control and Full Control groups.

TABLE 8

ORDERED MEAN DIFFERENCE SCORES BY CONDITION GROUPS ON ORIGINALITY

Condition	Mean difference score
Full control	-5.54
Modified control	0.60
SPECTRA+	14.01

Abstractness of Titles

This variable involved the child's ability to create interesting and novel titles to drawings. According to the test authors, abstractness of titles involves the thinking process of synthesis and organization. On the variable of abstractness of titles there were **no differences** between the groups.

Elaboration

According to the test authors, two assumptions underlie elaboration. The first is that a creative person can see a minimum of detail in order to see an underlying theme behind a drawing. Put another way, a creative person asks "What is the minimum detail that I must see for this to be a _____?" The second assumption behind elaboration is that the imagination and exposition of detail is a function of creative ability.

On the variable of elaboration, there were differences between the **Condition** groups (99% level of confidence). Table 9 contains the ordered mean difference scores (lowest to highest) for the three Condition groups. As can be seen in Table 9, the **SPECTRA+** group scored second highest behind the Modified Control group. Post-hoc analysis of differences between groups revealed that each group was significantly different from one another at the 99% level of confidence.

TABLE 9

ORDERED MEAN DIFFERENCE SCORES FOR THE CONDITION GROUPS ON THE VARIABLE OF ELABORATION

Condition	Mean difference score
Full control	9.74
SPECTRA+	18.09
Modified control	38.20

Resistance to Closure

According to the test authors, the creative person is one who is able to keep herself/himself cognitively "open" and delay closure on a task long enough to make the mental leap that makes original ideas possible. Put another way, the creative person is one who is willing to put off closure on a creativity problem long enough so that creativity can emerge.

On the variable of resistance to closure there were differences between the **Condition X Grade** groups (99% level of confidence). This means that there was an interaction between the Condition X Grade groups such that the three experimental conditions were affected and modified by grade. Table 10 contains the ordered mean difference scores

TABLE 10

ORDERED MEAN DIFFERENCE SCORES OF THE CONDITION X GRADE GROUPS AND POST-HOC ANALYSIS OF DIFFERENCES BETWEEN GROUPS (LEAST SQUARES METHOD) ON RESISTANCE TO CLOSURE

A. Rank Ordering of Mean Difference Scores

Group (condition-grade)	Mean difference score
Full control-2nd	-13.66
Modified control-5th	-10.13
Modified control-4th	-9.41
Full control-4th	-8.60
SPECTRA$^+$-4th	-7.17
Modified control-2nd	-5.64
Full control-5th	4.30
SPECTRA$^+$-2nd	10.77
SPECTRA$^+$-5th	13.53

B. Post-Hoc Analysis (Least Squares Method)

Group (condition-grade)	Group (condition-grade)								
	F-2nd	M-5th	M-4th	F-4th	S-4th	M-2nd	F-5th	S-2nd	S-5th
Full control-2nd (F-2nd)									
Modified control-5th (M-5th)									
Modified control-4th (M-4th)									
Full control-4th (F-4th)									
SPECTRA$^+$-4th (S-4th)									
Modified control-2nd (M-2nd)									
Full control-5th (F-5th)	*	*	*	*	*	*			
SPECTRA$^+$-2nd (S-2nd)	*	*	*	*	*	*			
SPECTRA$^+$-5th (S-5th)	*	*	*	*	*	*			

* = statistical significance at 99% confidence level.

(lowest to highest) for the nine Condition X Grade groups as well as the post-hoc analysis of differences between the groups on the variable of resistance to closure (Least Squares procedure). As can be seen from Table 10A, the **SPECTRA$^+$-5th grade** and **SPECTRA$^+$-2nd grade** groups made the largest gains in resistance to closure from pre-test to post-test of all the nine Condition X Grade groups. The **SPECTRA$^+$-4th grade** groups scored about in the middle of the distribution but scored negative gains on this variable. Table 10B shows that the **SPECTRA$^+$-5th grade**, **SPECTRA$^+$-2nd grade**, and **Full Control-5th grade** groups scored significantly better than all of the other six groups at the 95% level of confidence.

Summary of Torrance Tests of Creative Thinking Data Analysis

On the **total test** of creative thinking (i.e., summed over all of the subtest scores), the SPECTRA$^+$ children scored the highest over the Modified Control and Full Control groups.

On the subtest of **fluency**, there were no differences between any of the groups. On the subtest measuring **originality**, it was found that the SPECTRA$^+$ students scored the highest over the Modified Control and Full Control groups. For the variable of **elaboration**, the SPECTRA$^+$ group placed second behind the Modified Control group but ahead of the Full Control group. Finally, for the subtest measuring **resistance to closure**, an interaction between Condition and Grade was found. This interaction greatly favored the SPECTRA$^+$ group in that the SPECTRA$^+$-5th grade and SPECTRA$^+$-2nd grade groups scored highest of the nine Condition X Grade groups. However, the SPECTRA$^+$-4th grade group scored about in the middle of the distribution of Condition X Grade groups. All findings were at the 99% confidence level.

2. ACADEMIC ACHIEVEMENT

The next set of variables investigated was academic achievement. The achievement variable was assessed by examining children's standardized achievement test scores in the areas of reading and mathematics prior to and following children receiving the experimental SPECTRA$^+$ program or one of the control conditions. However, since the two school systems used different achievement tests (this was outside the control of the evaluator), comparisons between the school districts were impossible. Therefore, separate analyses are reported in this section for each school district. For a further discussion of the methodology and data analysis employed in the analysis of academic achievement data, please refer to Chapter Two.

Finally, it should be pointed out that, unless otherwise indicated, all data for academic achievement variables are represented as differences in **PERCENTILES** between pre-test and post-test. A percentile is a statistic that describes the percentage of people who took the test who scored **below** a given child's score. For example, if John scored in the 85th percentile in the Iowa Basic Skills Test in reading, this statistic means that 85% of the children who took the test scored below John's test score. It does **NOT** mean that John received a score of 85% correct on the test, but only that 85% of the children scored lower than John. Thus, percentiles give an indication of how students scored in relation to their peers who took the same test (in this case nationally).

School District A

For the analysis of all of the academic achievement data in the A school system, all three conditions (SPECTRA$^+$, Modified Control, and Full Control groups) were represented. For the reading tests, all three grades were represented. For the mathematics tests, only the fifth grade group was represented.

Total Reading. Total reading referred to the sum of the child's subscores in the area of reading. For total reading, there were **no differences** between any of the groups attending the District A schools.

Reading Vocabulary. On the variable of improvement in the child's reading vocabulary, there were **no differences** between the groups for children attending the District A schools.

Reading Comprehension. For the variable of reading comprehension, there were **no differences** between the groups for children attending school in the District A schools.

Total Math. The only children for which math achievement tests were available in pre-test and post-test conditions for the District A schools were children in 5th grade at the time of post-test. Thus, for the District A schools the available comparison is SPECTRA$^+$-5th grade vs. Modified Control-5th grade vs. Full Control-5th grade for boys and girls (please see Chapter Two for further discussion of this model).

On the variable of total math achievement for children attending District A schools, significant differences were found between the **Condition X Gender** groups (99% level of confidence). Thus, a significant interaction effect was found in which gender affected and modified the variable of condition.

Table 11 contains the ordered mean difference scores (lowest to highest) for the Condition X Gender groups for **total math achievement** scores as well as the post-hoc analysis of significance between those differences. As can be seen from Table 11A, the **SPECTRA$^+$-Males** scored second highest among the six Condition X Gender groups on total math achievement. On the negative side, the **SPECTRA$^+$-Females** showed the largest decrement in math achievement scores as reflected by percentile gains/losses. However, it is interesting that the females in all three conditions scored significantly worse than their male counterparts on math achievement regardless of condition, except for Modified Control-Males, who scored second from the bottom on total math achievement.

Math Concepts. The only children for whom math achievement tests were available in pre-test and post-test conditions for the A school district were the children in 5th grade at the time of post-test. Thus, for the A district the available comparison is SPECTRA$^+$-5th vs. Modified Control-5th vs. Full Control-5th for boys and girls (please see Chapter Two for further discussion of this model).

On the variable of math concepts, significant differences were found between the Condition X Gender groups (95% level of confidence). This means that an interaction was found in which gender affected and modified condition.

Table 12A contains the ordered mean difference scores (lowest to highest) for the **Condition X Gender** groups for **total math concepts** scores, while Table 12B shows the post-hoc analysis of significance between those differences. As can be seen from Table 12A, the **SPECTRA$^+$-males** was the only group among the six to show positive percentile gains in math concepts. On the negative side, **SPECTRA$^+$-females** showed a large decrement in math concept scores as reflected by percentile gains/losses.

Math Application. For the variable of math application, **no differences** were found between any of the groups in the A school district.

Math Comprehension. On the variable of math comprehension, a significant difference was found among the three **Condition groups** in the A school district (95% level of confidence). Table 13 contains the ordered mean difference scores (lowest to highest) for the three condition groups. As can be seen from Table 13, the **SPECTRA$^+$ group** scored highest in math comprehension at the 95% confidence level.

TABLE 11

ORDERED MEAN DIFFERENCE SCORES FOR THE CONDITION X GENDER GROUPS IN SCHOOL DISTRICT A ON TOTAL MATH ACHIEVEMENT (PERCENTILES) WITH POST-HOC ANALYSIS (LEAST SQUARES METHOD) OF DIFFERENCES BETWEEN THE GROUPS

A. Rank Ordering of Mean Difference Scores

Group (condition-gender)	Mean difference score
SPECTRA$^+$-females	-6.36
Modified control-males	-5.76
Full control-females	-5.50
Modified control-females	-0.39
SPECTRA$^+$-males	2.05
Full control-males	7.35

B. Post-Hoc Analysis (Least Squares Method)

	Group (condition-gender)					
Group (condition-gender)	SPECTRA$^+$-females	Modified control-males	Full control-females	Modified control-females	SPECTRA$^+$-males	Full control-males
SPECTRA$^+$-females						
Modified control-males						
Full control-females						
Modified control-females						
SPECTRA$^+$-males						
Full control-males	*	*	*			

* = 95% level of confidence.

TABLE 12

ORDERED MEAN DIFFERENCE SCORES FOR THE CONDITION X GENDER GROUPS IN SCHOOL DISTRICT A ON MATH CONCEPTS (PERCENTILES) WITH POST-HOC ANALYSIS (LEAST SQUARES METHOD) OF DIFFERENCES BETWEEN GROUPS

A. Rank Ordering of Mean Difference Scores

Group (condition-gender)	Mean difference score
SPECTRA$^+$-females	-15.18
Full control-females	-7.06
Modified control-males	-5.88
Full control-males	-3.85
Modified control-females	-3.58
SPECTRA$^+$-males	6.29

B. Post-Hoc Analysis (Least Squares Method)

	Group (condition-gender)					
Group (condition-gender)	SPECTRA$^+$-females	Full control-females	Modified control-males	Full control-males	Modified control females	SPECTRA$^+$-males
SPECTRA$^+$-females						
Full control-females						
Modified control-males						
Full control-males						
Modified control-females						
SPECTRA$^+$-males	*	*	*			

* = 95% level of confidence.

TABLE 13

ORDERED MEAN DIFFERENCE SCORES FOR THE THREE CONDITION GROUPS IN SCHOOL DISTRICT A FOR THE VARIABLE OF MATH COMPREHENSION (PERCENTILES)

Condition	Mean difference score
Modified control	-4.59
Full control	1.08
SPECTRA$^+$	4.50

School District B

For the B school district a full design could not be generated since in this district only two experimental conditions existed (SPECTRA$^+$ and Full Control). As was explained in Chapter Two, District A could not be compared with District B on academic achievement since the two districts did not use the same achievement tests. Since the Modified Control condition existed only in District A, this condition could not be included in District B's analysis of achievement test data. Further complicating matters was the fact that not all children in District B were administered achievement tests every academic year.

For these reasons, in District B, reading achievement data consist of SPECTRA$^+$ vs. Full Control groups at all grade levels. However, for math achievement, data were only available for the 5th grade students.

Total Reading. On the variable of total reading for children in District B schools, differences were found between the two **condition** groups (SPECTRA$^+$ vs. Full Control) at the 98% level of confidence. Table 14 contains the mean difference scores for the two condition groups. As can be seen from this table, the **SPECTRA$^+$ group** showed a greater degree of improvement on total reading scores than the Full Control group.

TABLE 14

MEAN DIFFERENCE SCORES FOR THE CONDITION GROUPS IN SCHOOL DISTRICT B ON TOTAL READING ACHIEVEMENT (PERCENTILES)

Condition	Mean difference score
Full control	-2.50
SPECTRA$^+$	0.85

Reading Vocabulary. On the variable of reading vocabulary, there was a significant difference between the two conditions in District B schools (99% level of confidence). Table 15 shows the mean difference scores for the two condition groups. As can be seen from this table, the **SPECTRA$^+$** group scored significantly higher on reading vocabulary than the Full Control group.

TABLE 15

MEAN DIFFERENCE SCORES FOR THE CONDITION GROUPS IN SCHOOL DISTRICT B ON READING VOCABULARY (PERCENTILES)

Condition	Mean difference score
Full control	-10.27
SPECTRA$^+$ 6-24	0.56

Reading Comprehension. For the variable of reading comprehension, a significant difference was found between the two **condition** groups of children in District B (99% level of confidence). Table 16 contains the mean difference scores for the two condition groups. As can be seen from Table 16, the **SPECTRA$^+$** group showed significantly greater improvement in reading comprehension than did the Full Control group.

Total Math. As stated earlier, for variables related to math achievement, data were only available for students in District B schools enrolled in 5th grade at the time of post-testing. On the variable of total math achievement, **no differences** were found between any of the groups.

TABLE 16

MEAN DIFFERENCE SCORES FOR THE CONDITION GROUPS IN SCHOOL DISTRICT B ON READING COMPREHENSION (PERCENTILES)

Condition	Mean difference score
Full control	-6.12
SPECTRA$^+$	0.97

Math Concepts. For the variable of math concepts, **no differences** were found between any of the groups enrolled in District B schools.

Math Application. For the variable of math application, **no differences** were found for any of the groups of students enrolled in District B schools.

Math Comprehension. For the variable of math comprehension, significant differences were found between the two **condition** groups enrolled in District B schools (96% level of confidence). Table 17 shows the mean difference scores for the two condition groups. As can be seen from this table, the **SPECTRA$^+$-group** scored significantly better in math comprehension than did the Full Control group.

TABLE 17

MEAN DIFFERENCE SCORES FOR THE CONDITION GROUPS IN SCHOOL DISTRICT B ON MATH COMPREHENSION

Group	Mean difference score
Full control	-7.68
SPECTRA$^+$	3.44

Summary of Data Analysis for Academic Achievement

The academic achievement test data had to be analyzed separately for the A and B school districts because the school districts use different standardized achievement test. For the A district, there were no significant differences found between the groups for total reading, reading vocabulary, and reading comprehension.

However, in the area of mathematics achievement, significant differences were found for students in District A. In the area of **total math achievement**, the **SPECTRA$^+$-males** scored second highest among the six Condition X Gender groups. However, the **SPECTRA$^+$-females** scored lowest. This finding should be tempered, however, by the fact that over all three conditions, females scored lower in total math improvement than their male counterparts.

For the area of **math concepts**, for students enrolled in District A, **SPECTRA$^+$-males** again scored the greatest improvement of the six Condition X Gender groups, and **SPECTRA$^+$-females** showed the least (actually negative) improvement. In fact, the **SPECTRA$^+$-males** was the only group to show improvement in the math concepts area.

For the area of **math application**, there were no differences between any of the groups for children in District A. Finally, for the area of **math comprehension** for children in District A, the **SPECTRA$^+$** group showed the greatest degree of improvement.

These findings point to the fact that for mathematics improvement in District A, differences between groups tended to favor the SPECTRA$^+$ students. However, the findings are somewhat modified by the fact that for most areas of

math achievement, **SPECTRA$^+$-males** improved much more than their **SPECTRA$^+$-female** counterparts.

In District B a full experimental design could not be carried out since not all the students in the district get tested in all years. Furthermore, since the Modified Control condition was nested within District A and the two districts used different achievement tests, District B data only included SPECTRA$^+$ vs. Full Control groups. For the reading achievement data in District B, comparisons among all three grades were possible. For the math achievement data, the only condition for which data were available was the SPECTRA$^+$ vs. Full Control groups and the only grade for which data were available was for the 5th grade pupils.

Regarding reading achievement in District B, the **SPECTRA$^+$** group showed the **biggest degree of improvement at all grade levels** over the Full Control group. This relationship held for the variables of total reading achievement, reading vocabulary, and reading comprehension.

For the area of math achievement, there were no differences between the groups for total math achievement, math concepts, or math application. However, for the area of **math comprehension**, the **SPECTRA$^+$** group scored significantly better than the Full Control group.

3. SELF-ESTEEM

As stated earlier, the instrument used to measure self-esteem was the modified 30-item version of the Culture-Free Self-Esteem Inventory. This instrument provides for a total self-esteem score as well as subscores in the areas of general, academic, social, and parental self-esteem. The results for total self-esteem as well as all of the subscale scores are described below.

Total Self-Esteem

No differences were found among the three conditions (SPECTRA$^+$, Modified Control, and Full Control) for the variable of total self-esteem.

General Self-Esteem

For this variable, a significant **Condition X Grade** main effect was found (95% level of confidence). This means that an interaction effect existed such that condition was affected and modified by grade.

Table 18 shows the rank ordering of the **Condition X Grade** mean difference scores (lowest to highest) and the resulting post-hoc analysis accomplished by the Tukey procedure. As can be seen from Table 18A, the **Full Control-2nd grade** and **Full Control-4th grade** groups showed the greatest degree of improvement in general self-esteem, while the **SPECTRA$^+$** groups scored in the lower and middle third on general self-esteem improvement. From Table 18B is can be seen that the Full Control-2nd grade, Full Control-4th grade, and the Modified Control-2nd grade groups showed statistically significantly higher general self-esteem improvement than did the Modified Control-4th grade, Full Control-5th grade, or SPECTRA$^+$-4th grade groups (95% confidence level).

Social Self-Esteem

Social self-esteem refers to how individuals view themselves regarding their success or failures with peers. The ANOVA for the social self-esteem subscale of the SEI found a significant **Condition X Gender** interaction main effect (99% level of confidence). This means that for social self-esteem, condition was affected and modified by gender.

Table 19A shows the rank ordering of mean difference scores (lowest to highest) of the Condition X Gender groups, while Table 19B shows the post-hoc analysis indicating which groups are different from one another. As can be seen from Table 19A, the **SPECTRA$^+$-males** showed the greatest degree of improvement in social self-esteem, while the **SPECTRA$^+$-females** showed the second worst degree of improvement. Post-hoc analysis (Table 19B) revealed that **SPECTRA$^+$-males** showed significantly more improvement in social self-esteem than **Full Control-males** and **SPECTRA$^+$-females**.

TABLE 18

ORDERED MEAN DIFFERENCE SCORES OF THE CONDITION X GRADE GROUPS ON GENERAL SELF-ESTEEM AND POST-HOC ANALYSIS OF DIFFERENCES BETWEEN GROUPS (TUKEY PROCEDURE)

A. Rank Ordering of Mean Difference Scores

Group (condition-grade)	Mean difference score
Modified control-4th	-0.020
Full control-5th	0.038
SPECTRA$^+$-4th	0.047
SPECTRA$^+$-2nd	0.63
SPECTRA$^+$-5th	0.83
Modified control-5th	0.91
Modified control-2nd	0.98
Full control-4th	1.06
Full control-2nd	1.17

B. Post-Hoc Analysis (Tukey Procedure)

Group (condition-grade)	Group (condition-grade)								
	M-4th	F-5th	S-4th	S-2nd	S-5th	M-5th	M-2nd	F-4th	F-2nd
Modified control-4th (M-4th)									
Full control- 5th F-5th)									
SPECTRA$^+$-4th S-4th									
SPECTRA$^+$-2nd (S-2nd)									
SPECTRA$^+$-5th (S-5th)									
Modified control-5th (M-5th)									
Modified control-2nd (M-2nd)	*	*	*						
Full control-4th (F-4th)	*	*	*						
Full control-2nd (F-2nd)	*	*	*						

* = statistical significance at 95% confidence level.

TABLE 19

ORDERED MEAN DIFFERENCE SCORES FOR THE CONDITION X GENDER GROUPS ON SOCIAL SELF-ESTEEM WITH POST-HOC ANALYSIS (LEAST SQUARES METHOD) OF DIFFERENCES BETWEEN THE GROUPS

A. Rank Ordering of Mean Difference Scores

Group (condition-gender)	Mean difference score
Full control-males	-0.16
SPECTRA$^+$-females	-0.05
Modified control-females	0.02
Full control-females	0.20
Modified control-males	0.27
SPECTRA$^+$-males	0.33

B. Post-Hoc Analysis (Least Squares Method)

	Group (condition-gender)					
Group (condition-gender)	Full control-males	SPECTRA$^+$ females	Modified control-females	Full control-females	Modified control-males	SPECTRA$^+$ males
Full control-males						
SPECTRA$^+$-females						
Modified control-females						
Full control-females						
Modified control-males	*					
SPECTRA$^+$-males	*	*				

* = 95% level of confidence.

Academic Self-Esteem

There were **no differences** between any of the groups on academic self-esteem.

Parental Self-Esteem

Parental self-esteem refers to the degree that children believe that their parents love and respect them as well as to the extent that students believe that their parents are proud of them in their endeavors. On the SEI, a significant **Condition X Grade** interaction was found for the variable of parental self-esteem. This means that there was an interaction such that condition was affected and modified by grade.

Table 20A shows the rank ordering of the Condition X Grade mean difference scores (lowest to highest), while Table 20B shows the post-hoc analysis investigating which Condition X Grade groups were different from one another on parental self-esteem. As can be seen from Table 20A, **SPECTRA$^+$-2nd grade** and **SPECTRA$^+$-4th grade** students

TABLE 20

ORDERED MEAN DIFFERENCE SCORES OF THE CONDITION X GRADE GROUPS ON PARENTAL SELF-ESTEEM AND POST-HOC ANALYSIS OF DIFFERENCES BETWEEN GROUPS (TUKEY PROCEDURE)

A. Rank Ordering of Mean Difference Scores

Group (condition-grade)	Mean difference score
Full control-2nd	-0.13
Modified control-2nd	0.001
SPECTRA$^+$-5th	0.037
Modified control-5th	0.103
Full control-4th	0.125
Full control-5th	0.264
Modified control-4th	0.325
SPECTRA$^+$-4th	0.339
SPECTRA$^+$-2nd	0.367

B. Post-Hoc Analysis (Tukey Procedure)

Group (condition-grade)	Group (condition-grade)								
	F-2nd	M-2nd	S-5th	M-5th	F-4th	F-5th	M-4th	S-4th	S-2nd
Full control-2nd (F-2nd)									
Modified control-2nd (M-2nd)									
SPECTRA$^+$-5th (S-5th)									
Modified control-5th (M-5th)									
Full control-4th (F-4th)									
Full control-5th (F-5th)	*								
Modified control-4th (M-4th)	*								
SPECTRA$^+$-4th (S-4th)	*	*	*						
SPECTRA$^+$-2nd (S-2nd)	*	*	*						

* = statistical significance at 95% confidence level.

showed the greatest degree of improvement on parental self-esteem, while **SPECTRA$^+$-5th grade** students scored third worst on parental self-esteem improvement. The post-hoc analysis (Table 20B) revealed that **SPECTRA$^+$-2nd grade** and **SPECTRA$^+$-4th grade** pupils were significantly different from **Full Control-2nd grade, Modified Control-2nd grade,** and **SPECTRA$^+$-5th grade** students at the 95% confidence level.

Summary of Self-Esteem Data Analysis

For the overall variable of self-esteem, **no significant differences** were found between the groups. However, significant differences were found for the subtests of the self-esteem instrument.

On the variable of **general self-esteem**, a significant **Condition X Grade** interaction was found. The **SPECTRA$^+$** groups scored about in the middle of the distribution for the nine Condition X Grade groups, while the **Full Control-2nd grade** and **Full Control-4th grade** groups scored highest.

For the variable of **social self-esteem**, a significant **Condition X Gender** interaction was found. The **SPECTRA$^+$-males** scored highest of the six Condition X Gender groups, while the **SPECTRA$^+$-females** scored second lowest.

While there were no significant differences for **academic self-esteem**, a significant **Condition X Grade** interaction was found for **parental self-esteem**. For parental self-esteem, the **SPECTRA$^+$-2nd grade** and **SPECTRA$^+$-4th grade** groups scored highest, while the **SPECTRA$^+$-5th grade** group scored third lowest in the distribution of the nine Condition X Grade groups.

4. LOCUS OF CONTROL

The ANOVA revealed that there were **no significant differences** between any of the groups on the variable of locus of control.

5. APPRECIATION OF THE ARTS

The Appreciation of the Arts Test (AAT) measures total appreciation of the arts as well as appreciating and valuing different art activities both in and out of school. Besides measuring total arts appreciation, eleven different subareas are tested by the instrument (please see Table 6 in Chapter Two for an overview of the subareas tested). The following section looks at differences between pre- and post-test scores as a function of condition, grade, and gender on appreciation of the arts.

Total Arts Appreciation

A significant difference in appreciation of the arts was revealed for **Condition** independent of grade or gender. Table 21 shows the rank ordering of the mean difference scores on appreciation of the arts for the three conditions (lowest to highest). Also included in the table is the post-hoc analysis investigating how the conditions differed from one another.

As can be seen from Table 21A, the **SPECTRA$^+$** condition scored the highest improvement for total appreciation of the arts over either the Modified or Full control conditions. Statistically, post-hoc analysis (Table 21B) revealed that the **SPECTRA$^+$** group scored significantly more improvement for total arts appreciation than either the modified or full control groups at the 95% level of confidence.

What Makes a Work of Art "Good"?

Children were given three possible criteria for judging whether a work of art was "good." These criteria included: "It is easy to see what the picture is about," "The different parts of the picture go together," and "The picture is not messy." There were **no significant differences** between any of the groups on this question.

TABLE 21

MEAN DIFFERENCE SCORES ON TOTAL APPRECIATION OF THE ARTS BY EXPERIMENTAL CONDITION AND POST-HOC ANALYSIS OF DIFFERENCES BETWEEN GROUPS (TUKEY PROCEDURE)

A. Rank Ordering of Mean Difference Scores

Condition	Mean difference score
Modified control	3.15
Full control	4.18
SPECTRA+	5.96

B. Post-Hoc Analysis (Tukey Procedure)

	Condition		
Condition	Modified control	Full control	SPECTRA+
Modified control			
Full control			
SPECTRA+	*	*	

What Makes a Piece "Artistically Valuable"?

The next ten questions dealt with issues of what makes a piece artistically worthwhile or valuable. Students were asked to agree, disagree, or respond "don't know" to the ten statements listed below:

1. If a painting costs a lot of money, then it must be good.
2. In deciding if a work of art is good, it is best to accept the word of an expert who knows art.
3. Your own likes and dislikes are good reasons for deciding if a work of art is good.
4. A good painting must look like something real.
5. A person needs special talents to become an artist.
6. Understanding art is important for everybody.
7. Whatever I like is good art for me.
8. A work of art should tell a story.
9. It's important for me to express my ideas and feelings through art.
10. We should spend more time on art in school.

The data analysis for each question regarding the worthiness of art is included below. It should be pointed out that upon first inspection, mean changes between all groups appear quite low (i.e., in fraction of points). However, it should be kept in mind that on all of these questions, students could only score "yes," "no," or "don't know," with "don't know" being assigned a score of 0. Thus, mean change ranges from 2 points for a certain response to 1 for another. Hence, mean changes are expected to be small. However, despite their relatively small magnitude, these percentages can still be quite highly statistically significant.

Question 1. No significant differences were found between the groups on this question.

Question 2. This question investigated the necessity of accepting the word of an expert before one could judge whether a work of art is good. A significant **Condition X Grade** interaction was found for this question. This means

that the three conditions were affected and modified by grade.

Table 22 contains the ordered mean difference scores for Question 2 as well as the post-hoc analysis of the differences between groups on this question (lowest to highest). As can be seen from Table 22A, the **SPECTRA$^+$** groups scored about in the middle of the nine Condition X Grade groups on this question, while two of the **Full Control X Grade** groups scored highest on this question. As can be seen from Table 22B, post-hoc (Tukey) analysis shows that the Full Control-5th grade, the Full Control-4th grade, and the Modified Control-2nd grade groups scored significantly higher than the Full Control-2nd grade group at the 95% level of confidence.

Question 3. This question dealt with one's likes or dislikes being enough to be the sole criterion for deciding whether a work of art is good. On this question, significant **Condition X Grade** differences were found. This means that there was an interaction in which the experimental conditions were modified by the variable of grade.

Table 23 contains the ordered mean difference scores (lowest to highest) for the Condition X Grade groups on Question 3 as well as the post-hoc analysis of those differences. As can be seen from Table 23A, the **SPECTRA$^+$-2nd grade** group scored highest on believing that external criteria exists for judging a work of art as "good." The **SPECTRA$^+$-4th grade** and **SPECTRA$^+$-5th grade** groups scored about in the middle of the distribution of the nine Condition X Grade groups. Post-hoc analysis (Least Squares Method) showed that virtually all of the groups except three were different from the Modified Control-2nd grade group at the 95% level of confidence.

Question 4. This question dealt with whether a painting must look like something real. It was predicated on the idea that students might realize that abstract works that are not "realistic" may nevertheless be works of art. On this question, significant **Condition X Grade** differences were found. This means that the three condition groups were affected and modified by the variable of grade.

Table 24 contains the rank ordering of mean difference scores (lowest to highest) and the post-hoc analysis of the differences between the mean difference scores for the Condition X Grade groups. As may be seen from Table 24A, the **SPECTRA$^+$-2nd grade** and **SPECTRA$^+$-4th grade** groups scored highest and third highest respectively among the nine groups. The **SPECTRA$^+$-5th grade** group scored second worst among the nine groups. The SPECTRA$^+$-2nd grade group was higher than all of the other groups except three at the 95% confidence level (Least Squares Method).

Question 5. Question 5 dealt with the notion that a person needs special talents to become an artist. It was predicated on the idea that art belongs to everyone and one does not need special artistic talent to be an "artist." On this question significant differences were found for the **Condition X Grade** groups. This means that the three condition groups were affected and modified by the grade variable.

Table 25 contains the ordered mean difference scores (lowest to highest) for the Condition X Grade groups on Question 5 as well as the post-hoc analysis (Least Squares Method) of the differences between the groups. From Table 25A it can be seen that the **SPECTRA$^+$-2nd grade** group scored in a virtual tie for the highest position, while the **SPECTRA$^+$-4th grade** and **SPECTRA$^+$-5th grade** groups scored in the top third of the distribution of Condition X Grade scores. Post-hoc analysis (Table 25B) indicated that all of the SPECTRA$^+$ groups, the Full Control-5th grade group, and the Modified Control-4th grade group scored significantly higher than the Modified Control-5th grade group at the 95% confidence level.

Question 6. Question 6 dealt with the notion that understanding art is important for everyone. For this question, significant differences between the **conditions** independent of grade or gender were found. Table 26 contains the rank ordering of the mean difference scores by condition. As can be seen from Table 26, the **SPECTRA$^+$** group actually scored **lower** than the other two groups and showed a decrease in this score from pre- to post-test. The Full Control group scored highest and was significantly different from the SPECTRA$^+$ group at the 95% confidence level.

TABLE 22

ORDERED MEAN DIFFERENCE SCORES OF THE CONDITION X GRADE GROUPS AND POST-HOC ANALYSIS OF DIFFERENCES BETWEEN GROUPS (LEAST SQUARES METHOD) ON QUESTION 2 REGARDING VALUING ART

A. Rank Ordering of Mean Difference Scores

Group (condition-grade)	Mean difference score
Full control-2nd	-0.31
Modified control-5th	-0.10
SPECTRA$^+$-2nd	-0.066
SPECTRA$^+$-5th	0.01
Modified control-4th	0.01
SPECTRA$^+$-4th	0.10
Modified control-2nd	0.133
Full control-4th	0.15
Full control-5th	0.15

B. Post-Hoc Analysis (Tukey Procedure)

Group (condition-grade)	Group (condition-grade)								
	F-2nd	M-5th	S-2nd	S-5th	M-4th	S-4th	M-2nd	F-4th	F-5th
Full control-2nd (F-2nd)									
Modified control-5th (M-5th)									
SPECTRA$^+$-2nd (S-2nd)									
SPECTRA$^+$-5th (S-5th)									
Modified control-4th (M-4th)									
SPECTRA$^+$-4th (S-4th)									
Modified control-2nd (M-2nd)	*								
Full control-4th (F-4th)	*								
Full control-5th (F-5th)	*								

* = statistical significance at 95% confidence level.

TABLE 23

ORDERED MEAN DIFFERENCE SCORES OF THE CONDITION X GRADE GROUPS AND POST-HOC ANALYSIS OF DIFFERENCES BETWEEN GROUPS (LEAST SQUARES METHOD) ON QUESTION 3 REGARDING ONE'S LIKES OR DISLIKES BEING THE SOLE CRITERION FOR DECIDING WHETHER A WORK OF ART IS GOOD

A. Rank Ordering of Mean Difference Scores

Group (condition-grade)	Mean difference score
Modified control-2nd	-0.27
Full control-5th	-0.07
Full control-4th	-0.03
SPECTRA$^+$-5th	-0.02
SPECTRA$^+$-4th	0.01
Modified control-4th	0.01
Full control-2nd	0.059
Modified control-5th	0.08
SPECTRA$^+$-2nd	0.13

B. Post-Hoc Analysis (Least Squares Method)

Group (condition-grade)	Group (condition-grade)								
	M-2nd	F-5th	F-4th	S-5th	S-4th	M-4th	F-2nd	M-5th	S-2nd
Modified control-2nd (M-2nd)									
Full control-5th (F-5th)									
Full control-4th (F-4th)									
SPECTRA$^+$-5th (S-5th)									
SPECTRA$^+$-4th (S-4th)	*								
Modified control-4th (M-4th)	*								
Full control-2nd (F-2nd)	*								
Modified control-5th (M-25th	*								
SPECTRA$^+$-2nd (S-2nd)	*								

* = statistical significance at 95% confidence level.

TABLE 24

ORDERED MEAN DIFFERENCE SCORES OF THE CONDITION X GRADE GROUPS AND POST-HOC ANALYSIS OF DIFFERENCES BETWEEN GROUPS (LEAST SQUARES METHOD) ON QUESTION 4 REGARDING WHETHER A PAINTING MUST LOOK LIKE SOMETHING REAL

A. Rank Ordering of Mean Difference Scores

Group (condition-grade)	Mean difference score
Full control-2nd	-0.04
SPECTRA$^+$-5th	0.02
Modified control-4th	0.05
Modified control-5th	0.05
Full control-4th	0.09
Full control-5th	0.10
SPECTRA$^+$-4th	0.21
Modified control-2nd	0.29
SPECTRA$^+$-2nd	0.33

B. Post-Hoc Analysis (Least Squares Method)

Group (condition-grade)	Group (condition-grade)								
	F-2nd	S-5th	M-4th	M-5th	F-4th	F-5th	S-4th	M-2nd	S-2nd
Full control-2nd (F-2nd)									
SPECTRA$^+$-5th (S-5th)									
Modified control-4th (M-4th)									
Modified control-5th (M-5th)									
Full control-4th (F-4th)									
Full control-5th (F-5th)									
SPECTRA$^+$-4th (S-4th)	*								
Modified control-2nd (M-2nd)	*	*	*	*					
SPECTRA$^+$-2nd (S-2nd)	*	*	*	*	*	*			

* = statistical significance at 95% confidence level.

TABLE 25

ORDERED MEAN DIFFERENCE SCORES OF THE CONDITION X GRADE GROUPS AND POST-HOC ANALYSIS OF DIFFERENCES BETWEEN GROUPS (LEAST SQUARES METHOD) ON QUESTION 5 REGARDING PERSON NEEDING SPECIAL TALENTS TO BECOME AN ARTIST

A. Rank Ordering of Mean Difference Scores

Group (condition-grade)	Mean difference score
Modified control-5th	-0.08
Full control-2nd	0.05
Modified control-2nd	0.08
Full control-4th	0.13
SPECTRA$^+$-4th	0.14
SPECTRA$^+$-5th	0.15
Full control-5th	0.19
SPECTRA$^+$-2nd	0.22
Modified control-4th	0.27

B. Post-Hoc Analysis (Least Squares Method)

Group (condition-grade)	Group (condition-grade)								
	M-5th	F-2nd	M-2nd	F-4th	S-4th	S-5th	F-5th	S-2nd	M-4th
Modified control-5th (M-5th)									
Full control-2nd (F-2nd)									
Modified control-2nd (M-2nd)									
Full control-4th (F-4th)									
SPECTRA$^+$-4th (S-4th)	*								
SPECTRA$^+$-5th (S-5th)	*								
Full control-5th (F-5th)	*								
SPECTRA$^+$-2nd (S-2nd)	*								
Modified control-4th (M-4th)	*								

* = statistical significance at 95% confidence level.

TABLE 26

ORDERED MEAN DIFFERENCE SCORES FOR EACH CONDITION ON QUESTION 6 REGARDING THE IMPORTANCE OF UNDERSTANDING ART

Condition	Mean difference score
SPECTRA+	-0.16
Modified control	-0.02
Full control	0.02

Question 7. Question 7 dealt with the belief that whatever a person likes constitutes good art for them. For this question a significant difference for **condition** was found independent of grade or gender. Table 27 shows the ordered mean difference scores for the three condition groups. As can be seen from Table 27, the **Full Control** group again scored highest, with the **SPECTRA+** and **Modified Control** groups virtually tied for second position. Post-hoc analysis indicated that the Full Control group scored significantly higher than the other two condition groups at the 95% level of confidence.

TABLE 27

ORDERED MEAN DIFFERENCE SCORES FOR EACH CONDITION ON QUESTION 7 REGARDING WHATEVER A PERSON LIKES CONSTITUTING ART

Condition	Mean difference score
Modified control	-0.12
SPECTRA+	-0.10
Full control	0.01

Question 8. Question 8 dealt with the idea that in order to be good, art must tell a story. On this question, **no significant differences** were found between any of the groups.

Question 9. Question 9 dealt with the idea that it is important for the person to express his/her ideas and feelings through art. There were **no significant differences** between any of the groups on this question.

Question 10. Question 10 (the final value question) dealt with the idea that more time should be spent in the schools on arts activities. There were **no differences** between the groups on this question.

Which One of These is a Work of Art?

The next question gave the students five objects (cars, poems, buildings, furniture, and clothing) and asked them to specify whether each could or could not be a work of art. On this variable a total "concept of works of art" score was derived. **No differences** were found between any of the groups on this variable.

Materials Used in School

The next question dealt with commonplace materials that students had used in school. These materials are those that often are utilized in arts activities (e.g., clay, papier-maché, crayons, etc.). Students were given a list of thirteen materials and asked if they had used them in school. Their responses were summed to yield a total materials-in-school score. Significant differences were found between the **conditions** on the number of materials used by students in school. Table 28 shows the rank ordering of the mean difference scores for the condition groups for the summed materials section (lowest to highest). As can be seen from Table 28, the **SPECTRA+** group

encountered the greatest number of materials in school. The **SPECTRA$^+$** group scored higher than both other groups at the 95% level of confidence.

TABLE 28

ORDERED MEAN DIFFERENCE SCORES FOR EACH CONDITION ON THE SUM TOTAL OF ART MATERIALS ENCOUNTERED IN SCHOOL

Condition	Mean difference score
Modified control	0.09
Full control	0.36
SPECTRA$^+$	0.70

Arts Activities in School

The next set of questions dealt with arts activities that occur in school. Students were given eleven activities, ranging from making a collage to watching a play, and were asked whether they had done any of the activities in school. The eleven activities were summed to yield a total activity score as well as individual sub-activity scores. For the purpose of this study, only the summed activity score is discussed in this report.

For the summed activity score, significant differences were found for the **Condition X Grade** conditions. This means that an interaction existed such that the three conditions were affected or modified by the variable of grade.

Table 29 contains the ordered mean difference scores and the post-hoc analysis that investigates the differences between the Condition X Grade groups (lowest to highest). As can be seen from Table 29A, the **SPECTRA$^+$-4th grade** and **SPECTRA$^+$-5th grade** groups scored in the **top third** in activities engaged in while at school, while the **SPECTRA$^+$-2nd grade** group scored about in the **middle** of the nine-group distribution. Surprisingly, the top scoring group was the Full Control-5th grade group. Post-hoc analysis (Table 29B; Least Squares Procedure) revealed that the Full Control-5th grade group was different from virtually every other group save one, while the SPECTRA$^+$-4th grade and Modified Control-4th grade groups were significantly different from the Modified Control-5th grade group at the 95% level of confidence.

Aesthetic Value of a Picture

The next question asked children to look at a picture and tell whether they enjoyed looking at it. The picture was a Japanese print of a person in traditional Japanese garb. The key issue measured by this question was whether, after exposure to the arts program, children would enjoy looking at a picture inconsistent with their cultural experience.

On this question, significant differences were found between the **Condition X Grade** groups (98% level of confidence). This means there was an interaction effect such that the three condition groups were affected or modified by the variable of grade.

Table 30 contains the rank ordering of the mean difference scores (lowest to highest) for the Condition X Grade groups as well as the post-hoc analysis of the differences between those means. As can be seen from Table 30A, the **SPECTRA$^+$-5th grade** group scored the greatest degree of improvement in enjoying viewing a picture inconsistent with their cultural experience. In fact, the **SPECTRA$^+$-5th grade** group was one of only three groups to show positive growth on this question. However, the **SPECTRA$^+$-2nd grade** and **SPECTRA$^+$-4th grade** groups scored relatively poorly in changing their viewpoint in enjoying this picture and actually rated the enjoyment of the picture more negatively on the post-test than on the pre-test.

TABLE 29

ORDERED MEAN DIFFERENCE SCORES OF THE CONDITION X GRADE GROUPS AND POST-HOC ANALYSIS OF DIFFERENCES BETWEEN GROUPS (LEAST SQUARES METHOD) FOR ARTS ACTIVITIES ENGAGED IN WHILE AT SCHOOL

A. Rank Ordering of Mean Difference Scores

Group (condition-grade)	Mean difference score
Modified control-5th	-0.027
Modified control-2nd	-0.23
Full control-4th	0.18
SPECTRA$^+$-2nd	0.24
Full control-2nd	0.32
SPECTRA$^+$-5th	0.45
SPECTRA$^+$-4th	0.52
Modified control-4th	0.73
Full control-5th	1.36

B. Post-Hoc Analysis (Least Squares Method)

Group (condition-grade)	Group (condition-grade)								
	M-5th	M-2nd	F-4th	S-2nd	F-2nd	S-5th	S-4th	M-4th	F-5th
Modified control-5th (M-5th)									
Modified control-2nd (M-2nd)									
Full control-4th (F-4th)									
SPECTRA$^+$-2nd (S-2nd)									
Full control-2nd (F-2nd)									
SPECTRA$^+$-5th (S-5th)									
SPECTRA$^+$-4th (S-4th)	*								
Modified control-4th (M-4th)	*								
Full control-5th (F-5th)	*	*	*	*	*	*	*		

* = statistical significance at 95% confidence level.

TABLE 30

ORDERED MEAN DIFFERENCE SCORES OF THE CONDITION X GRADE GROUPS AND POST-HOC ANALYSIS OF DIFFERENCES BETWEEN GROUPS (LEAST SQUARES METHOD) FOR ENJOYMENT OF VIEWING A PICTURE

A. Rank Ordering of Mean Difference Scores

Group (condition-grade)	Mean difference score
Full control-5th	-0.26
SPECTRA$^+$-4th	-0.018
SPECTRA$^+$-2nd	-0.008
Modified control-5th	-0.03
Modified control-4th	-0.02
Full control-5th	-0.02
Full control-2nd	0.02
Modified control-2nd	0.03
SPECTRA$^+$-5th	0.08

B. Post-Hoc Analysis (Least Squares Method)

Group (condition-grade)	Group (condition-grade)								
	F-5th	S-4th	S-2nd	M-5th	M-4th	F-5th	F-2nd	M-2nd	S-5th
Full control-5th (F-5th)									
SPECTRA$^+$-4th (S-4th)									
SPECTRA$^+$-2nd (S-2nd)									
Modified control-5th (M-5th)									
Modified control-4th (M-4th)									
Full control-5th (F-5th)	*								
Full control-2nd (F-2nd)	*								
Modified control-2nd (M-2nd)	*	*	*						
SPECTRA$^+$-5th (S-5th)	*	*	*						

* = statistical significance at 95% confidence level.

Visited or Attended and Would Like to Visit or Attend Museums, Concerts, and Dance Recitals

The next set of six questions dealt with the students' recent attendance at an art museum or gallery and attendance at concerts or dance recitals. These questions also investigated whether the students would LIKE to visit a museum or gallery or attend a concert or dance recital. It was hypothesized that even if students could not visit a museum or attend a concert or dance recital because of life constraints, participation in the SPECTRA$^+$ program would foster a **desire** to attend such events. For the following six questions on these topics, students answered "never," "once or twice," or "three or more times."

How Often Have You Visited an Art Museum or Gallery? On this question there were differences among the **Condition X Grade** groups (99% level of confidence). This means that there was an interaction effect such that the three conditions were affected or modified as a function of a child's grade.

Table 31 contains the rank ordering of the mean difference scores (lowest to highest) for the Condition X Grade groups as well as the post-hoc analysis investigating the differences between those means. As can be seen from Table 31A, the **SPECTRA$^+$-5th grade** and **SPECTRA$^+$-4th grade** groups scored in the top third of the distribution for visiting an art museum or gallery. The **SPECTRA$^+$-2nd grade** group scored among the lowest groups. However, since the Modified Control-2nd grade group also scored very low on this variable, the lack of visitation to an art museum or gallery by second grade students may be a function of their age rather than the failure of an arts program to make an impression on these students. Virtually all of the Condition X Grade groups except for the SPECTRA$^+$-2nd grade group scored higher than the Full Control-5th grade group that scored the lowest on this question (Least Squares Method).

How Often Have You Attended a Musical Concert? On this variable differences were found among the three experimental **condition** groups at the 97% confidence level. Table 32 shows the ordered mean difference scores for the three condition groups. On the post-hoc analysis, it was found that the **Modified Control group scored better than the SPECTRA$^+$ condition** at the 95% level of confidence.

Would You Like to Attend a Concert? On this variable **no differences** were found between any of the groups.

How Often Have You Watched Modern Dance or Ballet? For this variable significant differences were found among the three experimental **conditions** (99% confidence level). Table 33 contains the ordered mean difference scores for the three condition groups. As can be seen from Table 33, the **Full Control** condition scored highest, with the **SPECTRA$^+$** group scoring second highest. Post-hoc analysis revealed a significant difference between the Full Control and the Modified Control groups at the 95% confidence level.

Would You Like to Attend a Modern Dance or Ballet? On this variable significant differences were found between the **Condition X Grade** groups (98% level of confidence). This means that an interaction existed such that the experimental conditions were affected and modified by the variable of grade.

Table 34 contains the rank ordering of the mean difference scores for the Condition X Grade groups (lowest to highest) as well as the post-hoc analysis for the differences between the groups. As can be seen from Table 34A, the **SPECTRA$^+$-2nd grade** group scored the second highest in wanting to watch dance of the nine Condition X Grade groups. The **SPECTRA$^+$-4th grade** group scored about in the middle of the distribution, while the **SPECTRA$^+$-5th grade** group scored among the lowest of the groups. Post-hoc analysis (Table 34B) revealed that the Full Control-2nd grade group scored higher than five of the groups at the 95% level of confidence.

TABLE 31

ORDERED MEAN DIFFERENCE SCORES OF THE CONDITION X GRADE GROUPS AND POST-HOC ANALYSIS OF DIFFERENCES BETWEEN GROUPS (LEAST SQUARES METHOD) ON VISITS TO AN ART MUSEUM OR GALLERY

A. Rank Ordering of Mean Difference Scores

Group (condition-grade)	Mean difference score
Full control-5th	-0.47
SPECTRA$^+$-2nd	-0.26
Full control-2nd	-0.19
Modified control-2nd	-0.15
Full control-4th	-0.11
SPECTRA$^+$-4th	-0.11
SPECTRA$^+$-5th	0.01
Modified control-4th	0.01
Modified control-5th	0.18

B. Post-Hoc Analysis (Least Squares Method)

Group (condition-grade)	Group (condition-grade)								
	M-5th	S-2nd	F-2nd	M-2nd	F-4th	S-4th	S-5th	M-4th	M-5th
Modified control-5th (M-5th)									
SPECTRA$^+$-2nd (S-2nd)									
Full control-2nd (F-2nd)	*								
Modified control-2nd (M-2nd)	*								
Full control-4th (F-4th)	*								
SPECTRA$^+$-4th (S-4th)	*								
SPECTRA$^+$-5th (S-5th)	*								
Modified control-4th (M-4th)	*								
Modified control-5th (M-5th)	*								

* = statistical significance at 95% confidence level.

TABLE 32

ORDERED MEAN DIFFERENCE SCORES FOR EACH CONDITION ON ATTENDING A MUSICAL CONCERT

Condition	Mean difference score
SPECTRA+	-0.01
Full control	0.06
Modified control	0.02

TABLE 33

ORDERED MEAN DIFFERENCE SCORES FOR EACH CONDITION ON WATCHING MODERN DANCE OR BALLET

Condition	Mean difference score
Modified control	-0.11
SPECTRA+	-0.07
Full control	0.12

TABLE 34

ORDERED MEAN DIFFERENCE SCORES OF THE CONDITION X GRADE GROUPS AND POST-HOC ANALYSIS OF DIFFERENCES BETWEEN GROUPS (LEAST SQUARES METHOD) ON WANTING TO WATCH MODERN DANCE OR BALLET

A. Rank Ordering of Mean Difference Scores

Group (condition-grade)	Mean difference score
Modified control-2nd	-0.09
SPECTRA$^+$-5th	-0.08
Modified control-4th	-0.08
Full control-4th	-0.08
SPECTRA$^+$-4th	-0.03
Modified control-5th	0.10
Full control-5th	0.12
SPECTRA$^+$-2nd	0.20
Full control-2nd	0.30

B. Post-Hoc Analysis (Least Squares Method)

Group (condition-grade)	Group (condition-grade)								
	M-2nd	S-5th	M-4th	F-4th	S-4th	M-5th	F-5th	S-2nd	F-2nd
Modified control-2nd (M-2nd)									
SPECTRA$^+$-5th (S-5th)									
Modified control-4th (M-4th)									
Full control-4th (F-4th)									
SPECTRA$^+$-4th (S-4th)									
Modified control-5th (M-5th)									
Full control-5th (F-5th)									
SPECTRA$^+$-2nd (S-2nd)									
Full control-2nd (F-2nd)	*	*	*	*	*				

* = statistical significance at 95% confidence level.

Artistic Activities Engaged in Outside of School. The next question dealt with which artistic activities children engaged in outside of school. Students were given a list of activities and were asked whether they engaged in these activities during their free time outside of school. The logic behind this question was that if students valued the arts then they would choose to engage in those activities outside of school during their free, recreational time. There were **no significant differences** between any of the groups on arts activities engaged in outside of school.

Value of Art and Artistic Works

The next four questions dealt with the value of art and artistic works. It was hypothesized that exposure to the arts program would make children more sensitive to these questions and they would answer them in ways consistent with empathy for the arts.

There is No Real Value to Art Unless One Wants to Become an Artist. The first question dealt with the idea that art has no value unless one plans to become an artist. Empathy toward the arts would lead to rejection of this statement. On this question there were differences as a function of **condition** (99% level of confidence). Table 35 shows the ordered mean difference scores for the three condition groups. As can be seen from Table 35, the **SPECTRA$^+$** children showed the greatest improvement toward rejection of the statement that art is of no value unless one plans to become an artist. The SPECTRA$^+$ group was significantly different from both control groups at the 95% confidence level.

TABLE 35

ORDERED MEAN DIFFERENCE SCORES FOR EACH CONDITION ON ART HAVING NO VALUE UNLESS ONE PLANS TO BECOME AN ARTIST

Condition	Mean difference score
Modified control	-0.04
Full control	0.07
SPECTRA$^+$	0.35

A Work of Art Should Tell a Story. The next question dealt with the notion that a work of art should tell a story. Empathy toward the arts would lead to rejection of this statement. On this question there was **no difference** between any of the groups.

For Music To Be Good, It Should Have Words. As the two questions stated above, empathy toward the arts would reject this statement. Differences were found on this question among the three **condition** groups (99% level of confidence). Table 36 contains the rank ordering of the mean difference scores for the three condition groups. As can be seen from Table 36, the **SPECTRA$^+$** and **Full Control** groups finished in a virtual tie for greatest change in empathy toward the arts on this question. Both of these groups were significantly different from the Modified Control group at the 95% confidence level.

TABLE 36

ORDERED MEAN DIFFERENCE SCORES FOR EACH CONDITION ON VARIABLE THAT FOR MUSIC TO BE GOOD IT SHOULD HAVE WORDS

Condition	Mean difference score
Full control	0.30
SPECTRA$^+$	0.28
Modified control	0.10

It Is a Waste of Time to Dance. The final question dealt with receptiveness toward dancing. Empathy for the arts would result in rejection of this statement. On this variable, significant differences were found among the three **condition** groups. Table 37 contains the rank ordering of the mean difference scores for the three condition groups (95% level of confidence). As can be seen from Table 37, the **SPECTRA$^+$** group scored highest in empathy toward the arts on this question, while the Modified Control group scored lowest. The scores for the SPECTRA$^+$ group were significantly different from those for the Modified Control group at the 95% level of confidence.

TABLE 37

ORDERED MEAN DIFFERENCE SCORES FOR EACH CONDITION ON BELIEF THAT IT IS A WASTE OF TIME TO DANCE

Condition	Mean difference score
Modified control	0.44
Full control	0.56
SPECTRA$^+$	0.63

Summary of Appreciation of Arts Data

On total appreciation of the arts, the SPECTRA$^+$ students showed the greatest degree of improvement over both of the other condition groups. On virtually every subtest measured by the AAT, either no differences existed between the groups or the SPECTRA$^+$ students showed a decided advantage over their counterparts in other conditions. Finally, for those conditions that showed significant interactions between condition and grade, children in certain SPECTRA$^+$ groups at various grades showed decided advantages over other Condition X Grade groups.

CHAPTER FOUR

SUMMARY, DISCUSSION, AND RECOMMENDATIONS

This chapter attempts to briefly summarize results as well as discuss those results in the context of the arts program in the schools. Recommendations are made based upon the results of the data analyses reported in Chapter Three. Summary, discussion, and recommendations are reported below in terms of the methodology of the study as well as the dependent variables of creativity, academic achievement, self-esteem, locus of control, and appreciation for the arts. Finally, general recommendations regarding the SPECTRA$^+$ program as well as suggestions for follow-up evaluation are included in the last section.

1. METHODOLOGY

The methodology used in this evaluation study was empirical and parametric rather than ethnographic or descriptive. There is nothing inherently wrong with ethnographic or descriptive studies. In the correct contexts they can be extremely useful. However, a clear disadvantage of such designs is that they are highly dependent upon a particular person's (usually the researcher's) observations, and since numerical data are rarely provided, there is usually no way to check the validity of the researcher's conclusions (Fraenkal & Wallen, 1993). As a result, in ethnographic and descriptive studies observer and researcher bias is almost impossible to eliminate. Finally, since ethnographic research is usually based upon single or at most a severely limited number of observations, generalizations from the data are extremely difficult to make.

The present evaluator believed that while there is a plethora of descriptive studies that allude to the value of the arts in the schools, empirical evidence that confirms or denies this hypothesis are almost totally absent. For this reason, it was decided that the present study would offer an empirical and controlled methodology. It was hoped that data in sufficient amount and detail would be obtained so that the Central Limits theorem would be met and conclusions and generalizations could be offered.

It is believed that the current methodology met those conditions. Over 600 students at three grade levels in four schools participated in the study. A great deal of empirically based data were collected and analyzed in an objective, nonbiased fashion. It may be interesting to note that by the conclusion of data analyses, over **186,000** pieces of information as related to involvement of arts in the schools had been analyzed.

It is also believed that the inclusion of the **Modified Control group** was important in order to mitigate against the **Hawthorne Effect** discussed in Chapter Two. By initiating a Modified Control group whose members received an innovative non-arts program, it could be concluded that any statistical differences between the groups in favor of the SPECTRA$^+$ pupils could be attributed to the SPECTRA$^+$ program itself rather than the fact that the SPECTRA$^+$ children received **something** different while the Full Control pupils received nothing innovative.

It is the belief of the evaluator that, regardless of the results of the study, the project contains value in offering a methodology that may be used as the basis for further investigations for the effects of arts involvement in the schools. While ethnographic and descriptive studies have their rightful (and important) place in research, it is believed that further controlled and empirical study must be carried out in investigating the effects of the arts in the schools on children's education and affective functioning.

This is not to say, however, that the current methodology was not without its problems. The present study suffered from two shortcomings that simply could not be overcome because of the nature of the schools, educational reality, and the way programs were initiated prior to the evaluation project being conceived.

The first shortcoming was that of subject **nesting**. As was discussed in Chapter Two, students in the three conditions were nested in certain schools. That is to say, all of the SPECTRA$^+$ students attended two schools (in both school districts), while the Modified Control and Full Control students were nested in one school apiece. In a perfect research design, all three experimental conditions would have been spread throughout the four schools and children would have been assigned randomly to one of the three condition programs. This, however, was impossible. Certain schools were participating in the SPECTRA$^+$ program and others were not. Likewise, while it

might be scientifically advantageous to randomly assign children to conditions, the ethical considerations in doing so would have been unacceptable to parents, teachers, administrators, and the evaluator. Rather, it was decided to simply accept the nesting problem as it was found and describe it as forthrightly as possible in the evaluation report. While a limitation to the methodology, it is not believed that it compromised the results or the generalizability of those results significantly. Nevertheless, it is recommended that future studies in this area try to do away with subject nesting whenever possible.

The second methodological problem had to do with the academic achievement data. As was discussed on numerous occasions in this report, the two school districts involved in the study did not use the same standardized academic achievement tests. This made comparisons across the two districts impossible. Since the subjects were nested in certain schools and school districts, this means that full research design for academic achievement across the three experimental conditions (SPECTRA$^+$, Modified Control, and Full Control) could not be generated. Hence the best that could be accomplished was that for School District A all three conditions were compared, but in District B the SPECTRA$^+$ condition could only be compared with the Full Control condition. Likewise, since within each district not all children were tested at all grades in mathematics achievement, a full GRADE design could not be generated for mathematics achievement.

Thus, while the academic achievement data are interesting and provocative, they would have been that much stronger and convincing if a full research design could have been implemented in this phase of the study. For this reason, it is strongly recommended that future studies of the arts in the school take place across school systems that use the same standardized achievement tests and where all students are tested every year.

2. *CREATIVITY*

There was a strong indication in the data that creative thinking as measured by the Torrance Tests of Creative Thinking was facilitated by students' involvement in the arts. The **SPECTRA$^+$** students showed a significant advantage over the other two groups (Modified Control and Full Control) in the areas of **total creativity** and **originality**. Furthermore, the **SPECTRA$^+$** condition showed a significant advantage at the 5th grade and 2nd grade levels for the subtest of **resistance to closure**. The only subtest in which another group showed a superiority over the SPECTRA$^+$ condition was in the area of **elaboration**.

The finding that the SPECTRA$^+$ condition scored better on overall and various subtests of creative thinking as measured by the Torrance Tests holds important implications for educators, mental health professionals, and the business community. Numerous studies have reinforced the importance of creativity on **learning and achievement**. For example, creativity has been shown to be a contributor to academic achievement in adolescents and children (Carroll & Howieson, 1992; Olszewski, Kulieke, & Buescher, 1987; Zhang, 1985). One study (Torrance & Safter, 1989) even went so far as to find that creativity appeared to be the **most** predictive variable among all those tested by the investigators in predicting academic achievement.

Creativity has also been found to be correlated with **mental health** and **affective functioning**. For example, in one study (Carroll & Howieson, 1992) it was found that highly creative children scored higher on ego strength, imagery, adventurousness, self-sufficiency, and other positive personality variables than children low in creativity. The same study also found that highly creative children were more resourceful and less excitable than children who possessed low creativity. Likewise, children judged to be highly creative were found to judge moral events more appropriately, show greater perseverance on tasks, and have higher self-esteem than children who scored low in creativity (Pereda & Egea, 1986; Zhang, 1985). Thus it would appear that any program that fosters creativity in children such as the **SPECTRA$^+$** program is desirable due to the anticipated positive effects on academic achievement and mental health.

Creative thinking is not only important in childhood learning but is also crucial to life and professional success. Increasingly more businesses are becoming attuned to the idea that creativity in the work place is a necessary attribute in order for American business and industry to remain competitive. A variety of studies have found that the future of business depends on creative problem-solving behaviors and that business managers are becoming increasingly aware that business should be concerned with creativity and renewal rather than maintaining the established status quo (Ekvall, 1991; McGill, Slocum, & Lei, 1992; Stein, 1991). Creativity has been shown to be an important attribute for success in a variety of professional fields including teaching and the educational professions

(Ozunu, 1989), manufacturing (Ettlie & Reza, 1992), and the sciences and mathematics (Kovak, Held, & Proksa, 1988). It has been reported that Japanese businesses are restructuring their environment, previously emphasizing convergent thinking and group consensus, to one that encourages creativity and divergent thought (Basadur, Wakabayashi, & Takai, 1992; Yamada, 1991).

However, research has also indicated that whether children's creativity leads to increased academic achievement and improved mental health is also contingent upon how teachers and parents view creative behavior. For example, it has been found that in traditional classroom settings with severe time constraints to cover curriculum and emphasis on convergent thinking (finding the one right answer to problems), being creative can actually **interfere** with academic success (Toth & Baker, 1990). Thus, in traditional environments where teachers do not emphasize and reward creativity, creative thinking is negatively reinforced or punished and eventually extinguished.

Additionally, some intriguing data suggest that in cases where creative thinking is severely punished or extinguished, creative children can begin to express themselves in socially unacceptable ways. In a study of 300 youths in a juvenile justice system, it was found that a disproportionate number of youths were found to be highly creative (Mahoney & Seeley, 1982). It has been hypothesized that creative youths often are made to feel different and alienated from peers by virtue of their creativity and divergent thinking. In traditional educational environments, such children may find that their sensibilities and creative ways of looking at the world separate them from other children (Mahoney, 1980). This is not to imply that creative children are apt to become juvenile delinquents in a traditional educational curriculum. Rather, it is most probably true that such educational environments would need to be extremely unfavorable to cause a creative child to become socially maladjusted. However, it stands to reason that even if juvenile delinquency is not the outcome of creative children operating in a traditional educational environment that does not foster creativity, all of the **positive** effects of creativity described above should lead educators to strive to create educational environments in which creativity is fostered (Seeley, 1993).

From this discussion, it would seem clear that any innovative program that fosters and encourages creativity will have a positive effect on children's academic achievement and mental health and that, furthermore, such creativity will serve the individual well throughout adulthood. It has been demonstrated that in the present study the **SPECTRA$^+$** program led to significant gains in **total creativity, originality**, and **resistance to premature closure**. It is the position of this evaluation, in terms of the variable of creativity, that the SPECTRA$^+$ program should be viewed favorably by educators, mental health professionals, and business leaders.

3. ACADEMIC ACHIEVEMENT

As was discussed in the section of this chapter dealing with the methodology, generalization from the academic achievement data is somewhat limited by the fact that each school used different standardized academic achievement tests. Hence, comparison between District A and District B was not possible. Nevertheless, the findings regarding academic achievement were interesting and supportive for the **SPECTRA$^+$** program in the schools.

In terms of the effects of the SPECTRA$^+$ program on children's reading achievement, the results were mixed but nevertheless encouraging. While in District A no differences in improvement in reading achievement were found, strong differences were found in District B. Furthermore, in District B **large advantages** were found for the **SPECTRA$^+$** students in all grades for the variables of **total reading, reading achievement, reading vocabulary**, and **reading comprehension** over the Full Control condition.

However, it must be kept in mind that the reading achievement differences were found only in the school district in which SPECTRA$^+$ students could be compared to the Full Control condition. That is, in School District B there were no students in the Modified Control condition due to the issues of nesting (discussed in this and earlier chapters). The lack of a Modified Control condition in District B raises the possibility that the SPECTRA$^+$ children differed from the Full Control condition on reading achievement at least partially because of the effects of the **Hawthorne Effect**. As discussed in earlier chapters, the Hawthorne Effect refers to the phenomenon that the experimental group (in this case the SPECTRA$^+$ students) outperformed the Full Control students by virtue of the fact that the experimental group received something new and innovative while the Full Control group received the usual curriculum. Thus, the Hawthorne Effect posits that differences between groups are less a function of WHAT is contained in the

experimental curriculum and more a function of the uniqueness of anything novel in the child's educational curriculum.

It should be kept in mind that the current evaluation is **NOT** attributing the differences between the SPECTRA$^+$ and Full Control groups on reading achievement to the Hawthorne Effect. This effect might have been completely negligible and the improvement in reading scores may be entirely attributable to the curricular advantages contained in the SPECTRA$^+$ curriculum. Nevertheless, the author of this report would be remiss in his professional duties if he did not raise the issue of the Hawthorne Effect to the reader as a mitigating factor in data analyses on this variable. In the present study, the evaluator had to accept the three groups where they were found and thus accept the nesting problem. However, it is strongly suggested that further evaluation studies be conducted in which the three conditions are spread across all school districts and in which all districts use the same standardized academic achievement tests.

The mathematics achievement test results were both interesting and intriguing. For mathematics achievement, differences were found in School District A. Since District A allowed for analyses among all three condition groups, the Hawthorne Effect was not an issue. However, it should be kept in mind that for both Districts A and B, mathematics achievement test score data were only available in grade 5 due to the testing policies of each district.

For both school districts, any differences between groups on mathematics academic achievement were found in the direction of the **SPECTRA$^+$** students. This occurred for **total math** (SPECTRA$^+$ group tied for highest with Full Control group), **math concepts**, and **math comprehension** in District A and for **math comprehension** in District B.

However, for the areas of mathematics achievement in which differences were found, a significant **Condition X Gender** interaction was revealed. This means that differences in math achievement as a function of condition were modified and affected by gender. More specifically, it was the case for each math achievement variable in which differences were found that **males** showed significantly **more improvement** than **females**.

The finding of gender inequity in mathematics achievement in the present study has strong support in the available research literature. For example, one study (Felson & Trudeau, 1991) involving almost 400 students grades 5-8 found that although girls earned better overall grades and scored higher on test scores than their male counterparts, the same girls scored more poorly than boys in mathematics achievement. Similar findings of gender inequity in math achievement have been reported in recent years (e.g., Englehard, 1990; Lopez & Sullivan, 1991; Lummis & Stevenson, 1990). Hence, the finding that gender inequity in math achievement existed in the present study was not particularly surprising. What was intriguing was that in the area of total math achievement, math concepts, and math comprehension, the **SPECTRA$^+$ females** scored **lowest** of the six Condition X Gender groups.

The possible reasons for gender inequity in mathematics achievement as suggested by past research are provocative. On strong source of such gender inequity seems to emanate from **parents**. Studies have consistently shown that parents possess differing beliefs about their children's abilities based upon the gender of their child and that parents often believe that girls have less mathematical ability than boys (Felson & Trudeau, 1990; Jacobs, 1991).

Furthermore, it has been found that these differences in parental beliefs begin as early as the first grade and result in parents **behaving differently** toward their children based upon gender (Lummis & Stevenson, 1990). For example, one study found that parental beliefs in children's mathematical and spatial ability based on gender results in parents buying different types of toys for their children depending upon the sex of the children (Tracy, 1987). While toys involving reasoning and/or spatial ability are often purchased for young boys, toys requiring domestic and "nonreasoning" skills are more often purchased for young girls.

It is believed that such parental behaviors translate into differential mathematics achievement as a function of gender on the basis of both the children's **early developmental experiences** as well as their **self-perceptions**. Since girls experience less interaction with toys and activities requiring logical thought, reasoning, and spatial abilities early in their developmental lives, they are less prepared to deal with such mathematical concepts when they turn up in school (Tracy, 1987). Likewise, girls are more likely to believe that they cannot succeed in mathematics based upon the perceptions of their parents and other significant adults in their lives. This negative self-perception results in increased mathematics anxiety and negative mathematics self-esteem that interferes with math success in school

(Felson & Trudeau, 1991; Jacobs, 1991).

It is also believed that what goes on in the school classroom negatively impacts mathematics achievement for females. A number of studies have indicated that boys are treated differently than girls by classroom teachers regarding mathematics instruction. It has been found that boys vocally dominate the classroom and that boys get more attention and encouragement than girls (Sadker & Sadker, 1985; Smith & Glynn, 1990). Likewise, research has indicated that boys are treated more positively than girls when they call out an answer without raising their hands and that when boys and girls give the same answers, the responses from the boys are treated more positively than the answers from the girls. Finally, teachers call on boys more than girls, and boys are praised in class more often (Schmidt, 1982). It would stand to reason that such behaviors would lead to differential achievement in school as a function of gender.

However, the question remains: What is going on in the **SPECTRA$^+$** classrooms that causes the **largest** discrepancies between math achievement as a function of **gender**? Clearly, the SPECTRA$^+$ program is doing something right as reflected by the **highest** gains in math achievement for boys of all the Condition X Gender groups. However, what improvements can be made in the program regarding arts in the school and improvement of math achievement for females? The present evaluation study can offer no clues as to the answer since observations of teacher/student interactions were not a part of the current research design. However, it would seem that ethnographic investigation of the SPECTRA$^+$ program and its effect on the mathematics functioning of females would be a subject worthwhile for further study.

4. SELF-ESTEEM

Data analyses regarding the effects of the SPECTRA$^+$ program on children's self-esteem yielded mixed results. It was found that there were no differences among the three groups on Total or Academic self-esteem. Furthermore, Condition X Grade differences on general self-esteem placed the three grades of the SPECTRA$^+$ students about in the middle of the distribution of the nine Condition X Grade groups. However, in the areas of social and parental self-esteem, decided advantages were found in the direction of the SPECTRA$^+$ students.

It is difficult to hypothesize as to the reasons for these differential results. The present evaluation post-test data were collected after students had been in the SPECTRA$^+$ program for one year. Perhaps in encountering arts in their lives, students may initially encounter challenge to their belief and value system both as they apply to their own abilities and to stereotyped beliefs previously held about the arts. Such belief and value challenge, while useful and important, may initially result in anxiety and decrements in general self-esteem.

That such challenges to belief and value systems are often difficult for individuals was first proposed by Festinger (1957) and is known as **COGNITIVE DISSONANCE**. Cognitive dissonance refers to the phenomenon that when a person's belief or value system is challenged, he/she encounters tension, anxiety, or dissonance. This dissonance often results in an initial decrement in self-esteem (Aronson, 1972). However, research indicates that neither the anxiety nor the decrement in self-esteem lasts. Rather, the person is motivated to take action to reduce the dissonance with resulting belief change and **learning** taking place.

There is evidence that while initially uncomfortable, cognitive dissonance can lead to positive results for individuals (Deci, 1975). For example, such dissonance may lead to motivation to learn, curiosity about new and previously unencountered things, and eventually belief and value clarification and **increased** self-esteem.

It may be that the SPECTRA$^+$ program is **initially** increasing children's cognitive dissonance by exposing them to a world of the arts previously unencountered in their experiential lives. Such exposure to the arts may place them in conflict with stereotypical beliefs about the arts held by significant adults in the children's lives or by the children themselves. While such exposure to the arts may be disturbing initially to students and shake their value system, the resulting product may be a child who resolves this dissonance over time and who comes away with a more benevolent attitude both toward the arts and other individuals. However, in order for this hypothesis to be verified, a **longitudinal study** of the effects of the SPECTRA$^+$ program must be carried out.

It should also be pointed out that modified advantages for the SPECTRA$^+$ program were found in the areas of social

and parental self-esteem. For social self-esteem, a Condition X Gender effect was found. The results indicated that the **SPECTRA$^+$ Males** showed the **greatest improvement** in social self-esteem, while the **SPECTRA$^+$ Females** showed the **second worst** performance in this area (and actually decreased slightly from pre-test to post-test). This does NOT mean that the SPECTRA$^+$-Males were more popular than the SPECTRA$^+$-Females. Rather, it indicates that the SPECTRA$^+$-Males indicated in their self-perceptions that social interactions were easier and more positive for them than their female counterparts.

Again, such gender differences in the effects of the SPECTRA$^+$ program on social self-esteem are intriguing. Why is it that the SPECTRA$^+$-Males perceive themselves in a socially better light after involvement in the arts program than the SPECTRA$^+$-Females? Is the SPECTRA$^+$ curriculum interacting differentially with the two genders in such a way that boys come away from the arts experiences feeling more socially positive about themselves? Without an in-depth ethnographic study of the SPECTRA$^+$ curriculum and teacher/student interactions, such questions are impossible to answer. Nevertheless, the findings raise important issues as to gender equity about the SPECTRA$^+$ program and its resulting effects on children's mental and affective health and well-being as regarding gender equity.

For the area of parental self-esteem, a significant Condition X Grade interaction was found. For this subarea of self-esteem, the **SPECTRA$^+$-2nd grade** and **SPECTRA$^+$-4th grade** students showed the **greatest improvement** in their belief that their parents loved and supported them and were proud of them. The **SPECTRA$^+$-5th grade** students scored precisely in the **middle** of the six Condition X Grade groups. It is relatively apparent from these findings that the **SPECTRA$^+$ program may be having a positive effect on parent/child interactions in the home**. The SPECTRA$^+$ students are being given the opportunity to bring art projects home for parental inspection as well as having parents present for student performances. These experiences appear to be resulting in increased opportunities for positive parent/child interactions as well as parental involvement in their children's lives. In a society and culture in which parental/child interaction opportunities are diminishing and the family is experiencing increased stresses, it would appear that the **SPECTRA$^+$** program is providing an excellent mechanisms for **increasing bonds between parents and their children**.

5. LOCUS OF CONTROL

The fourth variable investigated was locus of control. The Bialer-Cromwell Locus of Control Scale yields a unitary index of locus of control. On this instrument no differences were found among the experimental conditions.

These nonsignificant results were problematic for the evaluator, who hypothesized that involvement in the SPECTRA$^+$ program would result in children feeling that they had increased control over what went on in their lives. A number of explanations for this "non-finding" might exist. The first simply is that involvement in the arts does not affect how one views the issue of control over his/her life. However, it may also be that either the instrument used was not sensitive enough to reveal differences or that merely a one-year involvement in the SPECTRA$^+$ program is insufficient time to yield such differences. In order to judge which of these three hypotheses is most correct, a longitudinal follow-up study is recommended in subsequent years, with locus of control being one of the dependent variables assessed.

6. APPRECIATION OF THE ARTS

As expected, involvement in the arts program resulted in an increased appreciation and enjoyment of the arts on the part of students. While not intuitively surprising, this finding is nevertheless important.

Enjoyment and appreciation of the arts is a lifelong endeavor that may significantly enrich one's life and mental and affective health. For example, a number of studies have shown that involvement in the arts either as an active participant or as an observer has positive effects on mental health and reduces stress, anxiety, and depression (Aach, 1981; Uhlin & DeChiara, 1982). It has been reported that the arts help children develop a sense of self-worth, uniqueness, and self-understanding (Atack, 1982; Clements & Clements, 1984). Likewise, involvement in the arts has been correlated with developing a heightened world view as well as helping one become more tolerant of other people and other cultures (Eisner, 1987; Starms, 1979).

For these reasons, any program that heightens children's affect and appreciation for the arts is an important contributor to a well-rounded and meaningful education. Thus, the current finding that the **SPECTRA$^+$** program achieved these aims was viewed as extremely positive and supportive of continuance of the program by the present evaluator.

7. RECOMMENDATIONS

On the basis of the findings from the present study, the following recommendations are proposed:

1. In its first year evaluation, the **SPECTRA$^+$** program yielded **positive** results in terms of children's **creativity, academic achievement, self-esteem, and appreciation of the arts**. While these positive findings were somewhat modified by variables of gender and grade and while in some areas advantages for the SPECTRA$^+$ program were not shown, it is nevertheless believed that the **SPECTRA$^+$ program shows sufficient potential for its continuance in the two school districts studied**.

2. Evaluation of the SPECTRA$^+$ program in the schools should be continued in a **longitudinal framework**. The children currently in the program should be followed throughout their involvement in the program in the controlled design outlined in the current methodology. Post-testing of students should be accomplished on a yearly basis on the dependent variables used in the present study. Results should be analyzed in terms of assessing continued and/or long-term differences among the three condition groups.

3. The students utilized in the present study should be followed longitudinally throughout their junior high school and high school careers to assess the **long-term effect** (or impact) of the SPECTRA$^+$ program on students' lives. Currently the SPECTRA$^+$ program ends at the conclusion of elementary school. However, will its effects stay in place even years after the program has been terminated? Put another way, will the positive gains shown by the SPECTRA$^+$ students over the two other conditions be powerful enough so that they will continue even after children have graduated the program? Such a question is relevant to the extent that any gains made by students in the SPECTRA$^+$ program should not be short-lived and transitory but continue throughout their academic lives.

4. It is recommended that the **SPECTRA$^+$ program be expanded to older students on a pilot-study basis**. The current SPECTRA$^+$ program involves only elementary school aged students. While intuition suggests that EARLY involvement in the arts is most facultative, this idea needs to be empirically tested. It may actually be that in terms of their cognitive and affective development older students are actually best suited and prepared for an arts involvement program and would benefit as much or more from such a program than their elementary school aged counterparts. For this reason, it is recommended that the **SPECTRA$^+$ program be expanded to junior high school and high school students** and the current methodology be carried out with that population in the evaluation design used in the present study.

5. It is imperative that the **issue of gender inequity** among the SPECTRA$^+$ students in terms of mathematics achievement and social self-concept functioning be addressed. Ethnographic and descriptive studies that investigate both the SPECTRA$^+$ curriculum and adult/student interactions within the program must be carried out in order to ascertain the area contributing to gender inequity. It is believed by the present evaluator that the **SPECTRA$^+$** program has the potential of improving achievement and affective functioning of **all** students involved in the program regardless of gender. However, it falls to the administrators, educators, and artists involved in the program to insure such equity of results for all students receiving the SPECTRA$^+$ curriculum.

8. CONCLUSIONS

In conclusion, it is the recommendation of this evaluation author that the **SPECTRA$^+$ program be continued and expanded**. The current evaluation endeavor represented an admirable desire on the part of the Hamilton-Fairfield Arts Association to empirically measure the effectiveness of the SPECTRA$^+$ program in the schools in an area of education (the arts) where formal evaluation is relatively rare. The project was not without its flaws and problems, all of which have been reported forthrightly in this report. Methodological problems notwithstanding, however, the results of this project demonstrate that **sufficient evidence exists to support the idea that arts in the school is**

a significant contributor to the academic achievement and affective well-being of children.

This is not to imply that all of the data evaluated found a significant advantage for the SPECTRA$^+$ program over the two control groups. This was not the case. In some instances no differences among the groups were found. In a limited number of instances, advantages were found for one of the two control groups. In the area of math academic achievement, advantages in favor of the SPECTRA$^+$ group were tempered by gender inequities. However, in enough instances sufficient advantages were found for the SPECTRA$^+$ children in the area of creativity, math and reading achievement, self-esteem subscores, and appreciation of the arts to warrant continuation of the program in elementary school and expansion of the program into junior high and high school.

Finally, it should be kept in mind that these advantages for the SPECTRA$^+$ program were found after only one year of the program's operation. It may be that such advantages might increase as children continue in the arts program over their elementary school careers. For this reason, it is imperative that any continuation and expansion of the program contain a strong evaluation component (both empirical and ethnographic) so that the SPECTRA$^+$ program can not only continue in providing quality and well-rounded education to students but also improve in its service delivery.

REFERENCES

Aach, S. (1981). Art and the IEP. in L. N. Kearns et al. (Eds.). Readings: Developing arts programs for handicapped students. Harrisburg, PA: Pennsylvania State Department of Education.

Aronson, E. (1972). The social animal. San Francisco: Freeman Publishing Co.

Atack, S. M. (1982). Art activities for children. Englewood Cliffs, NJ: Prentice Hall.

Basadur, M. S., Wakabayashi, M., & Takai, J. (1992). Training effects on the divergent thinking attitudes of Japanese managers. International Journal of Intercultural Relations, 16, 329-345.

Battle, J. (1981). The Culture-Free Self-Esteem Inventory for Children and Adults. Seattle: Special Child Publications.

Bialer, I. (1961). Conceptualization of success and failure in mentally retarded and normal children. Journal of Personality, 29, 303-320.

Boyer, E. L. (1983). High school: A report on secondary education in America. New York: Harper & Row.

Carroll, J., & Howieson, N. (1992). Recognizing creative thinking talent in the classroom. Roeper Review, 14, 209-212.

Clements, C. B., & Clements, R. D. (1984). Art and mainstreaming. Springfield, IL: Charles C. Thomas.

Deci, E. (1975). Intrinsic motivation. New York: Plenum Publishing Company, Educational Testing Service.

Eisner, E. W. (1987). Educating the whole person: Arts in the curriculum. Music Educators Journal,73, 37-41.

Ekvall, G. (1991). Change-centered leaders: Empirical evidence of a third dimension of leadership. Special Issues: Leadership and personal creativity. Leadership and Organization Development Journal, 12, 18-23.

Englehard, G. (1990). Gender differences in performance on mathematics items: Evidence from the United States and Thailand. Contemporary Educational Psychology, 15, 13-26.

Ettlie, J. E., & Reza, E. M. (1992). Organizational integration and process innovation. Academy of Management Journal, 35, 795-827.

Felson, R. B., & Trudeau, L. (1991). Gender differences in mathematics performance. Social Psychology Quarterly, 54, 113-126.

Festinger, I. (1957). A theory of cognitive dissonance. Stanford, CA: Stanford University Press.

Fowler, C. (1990). Arts education and the NEA: Does the National Science Foundation point the way? Design for Arts in Education, 91, 7-18.

Fraenkel, J. R., & Wallen, N. E. (1993). How to design and evaluate research (2nd ed.). New York: McGraw-Hill.

Goodlad, J. T. (1984). A place called school. Alexandria, VA: Association for Supervision and Curriculum Development.

Jacobs, J. E. (1991). Influence of gender stereotypes on parent and child mathematics attitudes. Journal of Educational Psychology, 83, 518-527.

Kovak, T., Held, L., & Proksa, M. (1988). The chemistry teacher's creative achievement. Psychologica Dietata, 23, 139-144.

BEST COPY AVAILABLE

Lopez, C. L., & Sullivan, H. J. (1991). Effects of personalized math instruction for Hispanic students. Contemporary Educational Psychology, 16, 95-100.

Lummis, M., & Stevenson, H. W. (1990). Gender differences in beliefs and achievement: A cross-cultural study. Developmental Psychology, 26, 254-263.

Mahoney, A. R. (1980). Gifted delinquents. Children and Youth Services Review, 2, 315-330.

Mahoney, A. R., & Seeley, K. R. (1982). A study of juveniles in a suburban court. Technical report. Washington, DC: U.S. Department of Justice OJDPP.

McGill, M. E., Slocum, J. W., & Lei, D. (1992). Management practices in learning organizations. Organizational Dynamics, 21, 5-17.

Mitchell, J. W., Jr. (1985). Review of the Culture-Free Self-Esteem Inventory. In The ninth mental measurements yearbook. Lincoln, NE: University of Nebraska Press.

National Commission on Music Education. (1991). Growing up complete: The imperative for music education. Reston, VA: Report of the National Commission on Music Education.

National Endowment for the Arts. (1989). Towards civilization. Washington, DC: U.S. Government Printing Office

Olszewski, P., Kulieke, M. J., & Buescher, T. (1987). The influence of the family environment on the development of talent. Journal of the Education of the Gifted, 11, 6-28.

Ozunu, D. (1989). The psychological analysis of teachers' creativity. Revista de Psihologie, 35, 105-116.

Pereda, S., & Egea, M. P. (1986). Need achievement, success, and originality in noncontingent tasks. Informes de Psicologia, 5, 23-39.

Sadker, M., & Sadker, D. (1985). Sexism in the schoolroom of the 8's. Psychology Today, 19, 54-57.

Schmidt, P. J. (1982). Sexist schooling. Working Woman, 7, 101-102.

The second assessment of art. (1979). Princeton, NJ: Educational Testing Service.

Seeley, K. R. (1993). Gifted students at risk. In L. Silverman (Ed.), Counseling the gifted and talented. Denver: Love Publishing Co.

Smith, A. B., & Glynn, T. L. (1990). Contexts for boys and girls learning mathematics: Teacher interactions and student behavior in two classrooms. New Zealand Journal of Psychology, 19, 9-16.

Starms, F. B. (1979). Music is interwoven with life. The interdisciplinary use of art, music and literature in habilitation of the young handicapped child. Madison, WI: Wisconsin State Department of Public Instruction.

Stein, M. I. (1991). Creativity in people. Special Issue: Leadership and personal creativity. Leadership and Organizational Development Journal, 12, 4-10.

Torrance, E. P. (1992). Torrance Tests of Creative Thinking. Bensenville, IL: Scholastic Testing Service.

Torrance, E. P., & Safter, H. T. (1989). The long range predictive validity of the Just Suppose Test. Journal of Creative Behavior, 23, 219-223.

Toth, L. S., & Baker, S. R. (1990). The relationship of creativity and instructional style preferences to overachievement and underachievement in a sample of public school children. Journal of Creative Behavior, 24, 190-198.

Tracy, D. M. (1987). Toys, spatial ability, and science and mathematics achievement: Are they related? Sex Roles, 17, 115-138.

Uhlin, D. M., & DeChiara, E. (1984). Art and exceptional learners (3rd ed.). Dubuque, IA: Wm. C. Brown Publishing Co.

Yamada, K. (1991). Creativity in Japan. Special Issues: Leadership and personal creativity. Leadership and Organizational Development Journal, 12, 11-14.

Zhang, D. (1985). An exploratory study of creative thinking in adolescents. Information on Psychological Sciences, No. 2, 20-25.

Hamilton Fairfield
Arts Association
101 S. Monument Avenue
Hamilton, Ohio 45011-2833